



FRIDAY, MAY 31, 1895.

CONTENTS

PAGE	PAGE
ILLUSTRATIONS:	New Publications..... 350
Heavy and Hard Rails on the Boston & Albany Railroad..... 339	Trade Catalogues..... 350
The Boston Rapid Transit Subway..... 341	GENERAL NEWS:
Map showing Joint Workings of English Railroad Lines..... 342	Locomotive Building... 352
Dodge Coal Storage Plant of Philadelphia & Reading Railroad... 344	Bridge Building..... 352
Turner's Facing Point Lock..... 346	Railroad Law..... 352
CONTRIBUTIONS:	Meetings and Announcements..... 352
What is the limit of the Passenger Capacity of a Suburban Track..... 339	Personal..... 353
EDITORIALS:	Elections and Appointments..... 351
The Railroads, the City and the Suburbs..... 348	Railroad Construction... 354
The Convention of Railroad Commissioners... 349	General Railroad News... 354
American and English Railroads..... 349	MISCELLANEOUS:
EDITORIAL NOTES..... 348, 350	Technical..... 347
	The Scrap Heap..... 351
	The International Railroad Congress..... 343
	Debs to be Imprisoned for Contempt..... 343
	Railroad Legislation in Tennessee..... 346
	Traffic through the Soo Canal..... 347
	Rhode Island Locomotive for Mexico..... 347

Contributions.

What is the Limit of the Passenger Capacity of a Suburban Track.

NEW YORK, May 17, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The daily papers have printed a statement from the Rapid Transit Commission that the capacity of the proposed two rapid transit tracks below Fourteenth street will be 90,000 passengers an hour. This is based on 60 trains for local service, and 30 trains for express service an hour, each train being composed of 10 cars carrying 100 passenger each.

This figure, if correct, would prove that the Manhattan Elevated road must be going at a snail's pace, because with its four tracks below Fourteenth street it is not able to comfortably carry 30,000 passengers an hour, which is about the average, while 30,000 passengers an hour on one track is the highest record. This comparison alone should prove that there is something wrong in the above figure or merely a *captatio benevolentia*, because it is a well-known fact that the Manhattan Company does the best it can, even better than any other urban railroad in the world in regard to trainmen, stops, etc., as a reference to the report of Mr. William Barclay Parsons will show, and it can be regarded as carrying the highest number of passengers in local traffic that it is possible to carry. It is not that it could do better that we need a tunnel road, but because the Elevated road cannot do all the business, anyhow.

In view of the peculiar difference it will perhaps be of interest to see what the real capacity of the two tracks, one local and one express, are: The Rapid Transit Commission give as the capacity of their proposed car, 100 passengers, against 48 seats in the present "L" road cars. The Manhattan Company states that there is further standing room for 32 passengers more, or 80 passengers in all, and every New Yorker knows that the "L" road is not exactly modest in its claim of standing capacity, especially because they take as the above highest record shown considerably more than that if necessary.

Speaking of the average capacity, I cannot imagine that anybody would think of anything else than of the seating capacity as an average, leaving the case of people standing for exceptional cases and not when they go daily down town to their offices and return from them.

Such a car of the "L" road is 45 ft. long, and if we take the rapid transit car as being only 60 ft. long, we can see that about 30 passengers of the estimated 100 would have to stand.

A train of 10 cars and the motor will be 700 ft. long. The stations would have to be, at least, of the same length, and so it would be almost more advantageous to construct the tunnel all through of the whole width of the stations. Most stations would be only three train lengths apart. The "L" road stations are not over 200 ft long. There would further be necessary a rolling stock of, at least, 2,000 cars, if we assume that besides the 90 trains starting in one direction during the rush hours there must be trains on the other parts of the tracks besides (the elevated road has only 1,000 cars). A moving sidewalk would in such a case be the better proposition, although they only claimed 33,000 passengers an hour in Chicago. Taking into consideration that such long trains would be uneconomical to handle, and would require special brakes and machinery for traction, and could not get up any speed within the short distance between stations, we must conclude that it is impractical, if not impossible, to go over five cars and a train of 300 ft. in length as now used. A car over 40 ft. in length, with standing room and end doors should not be permitted to be used, as people seated in the center of a crowded car will find it impossible to get out in time, and the arrangement of additional doors in the center has even been earnestly advocated with the short cars,

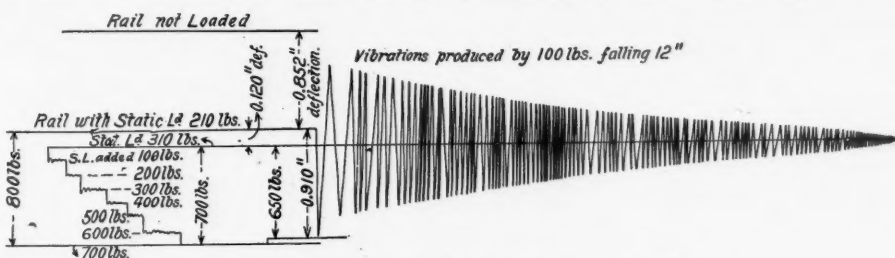
but of course would need either a double train crew or stops twice as long.

The capacity of such a train is 240 passengers seated, or including those standing it is 400 in all. Taking 50 trains an hour for the local and 20 for the express track we have a train every 1½ minutes on the local track and one every 3 minutes on the express track. This is all that would be safe, and I would rather say it is over the safe limit, because 3 minutes distance is dangerous for a train expected to run at the rate of 40 miles an hour, and I would not recommend it if it were not for the fact that above Fourteenth street the distance is double.

Below is a table of the number of trains during the rush hours on the elevated road as an example of what can be done. It is compiled from the time tables of the Sixth and Ninth avenue lines, northbound, between 5 and 7 p. m.:

	5th Ave.	6th Ave.	59th St.	135th St.
Local Express	1	2	10	8
5 O'clock	4	3	9	8
5:15	5	3	11	8
5:30	5	3	11	11
5:45	5	3	11	14
6:00	5	3	10	14
6:15	4	3	7	13
6:30	4	2	8	13
6:45	3	0	7	11
7:00				

In the hour between 5:15 and 6:15 o'clock there run on Ninth avenue 24 trains, of which 6 are express trains, and on Sixth avenue 49 trains, of which 10 go to Fifty-eighth street, the remaining 39 trains going over to Fifty-ninth street and Ninth avenue and there join the previously mentioned 24 Ninth avenue trains, making at



Dudley's Experiments to Ascertain the Deflection of Rail.

this junction 63 trains an hour, of which 10 remain and return and only 53 trains continue on the two tracks northward, six of them being express trains, leaves 47 trains on the local track. We see that the Sixth avenue line has the highest record with 49 trains, starting simultaneously from South Ferry, Rector and Franklin streets, the record of Fifty-ninth street station, 63 trains, is of no avail, as it could not be maintained on a current track and is applicable to this station only.

In spending an evening hour at Fifty-ninth street or Chatham Square stations (the highest record at the latter station is 56 trains, with 45 for Third avenue) any person can very easily see that there is no possibility of increasing the number of trains. Trains follow so quickly that if they were as long as the Rapid Transit Commission suggest a tail end collision would be of daily occurrence. It should be especially noted that the high record on the Sixth avenue line can be only attained by starting three trains at one time at different stations, because it shows that the requirements of traffic and working are entirely disregarded in the "adopted plans" which show one pair of tracks below City Hall.

From the figures given we get the following capacity:

	Number of trains.	Seating capacity.	Highest permissible capacity.
Local trains.....	50	12,000	20,000
Express trains.....	20	4,800	8,000

There is no question that the capacity actually used by the Third avenue line of 30,000 an hour could be attained, but it is also out of the question that such a mode of travel should be considered. The highest permissible capacity of the whole Rapid Transit road below Fourteenth street, consisting of two tracks, would then be 28,000 passengers, of whom 10,000 would have no seats, and the necessity of construction of four tracks down to City Hall, and two below it, seems to be evident if the service of this road shall be anything like what it is expected to be.

In European cities, where cars with side doors are used, the seating capacity of the cars is increased, because the aisle in the center can be used for seats. The trains which there, as well as here, have not more than five cars can accommodate more passengers (400 to 500 against 240 to 400), but as the closing of the doors take more time than cars with end gates only, the stops are longer, and trains cannot be in the least less than two minutes apart, so that the hourly capacity is the same in the end. A superficial investigation I have made does not show any route having a greater capacity than 15,000 passengers an hour and no greater maximum capacity than 30,000 passengers an hour is given. As the Rapid Transit Commission claim that 60,000 passengers an hour could be handled by one track this claim should not go unchallenged.

FR. VON EMPERGER.

Heavy and Hard Rails on the Boston & Albany.

[WITH AN INSET.]

The Boston & Albany Railroad diagrams of track inspection (as is true of all mountainous roads) have always been exceedingly interesting as showing the increased wear of the steel on the combined curves and gradients over that of the steel on the straight and level portions of the line. The destructive wear on the combined curves

and gradients is so greatly increased by the use of sand on the ascending gradients and the extensive use of brakes on the descending gradients, that the wear of the steel is much increased, per ton of traffic, over the steel on the level portions of the line. This is to be expected, and no railroad by labor alone ever has or ever can wholly overcome its effects upon the condition of the track. To check it, provision must be made in the steel and at the joints.

The receiving ends of the rails on the gradients, from their inclination, receive the wheel loads more in the nature of suddenly applied loads, increasing, possibly doubling, the stresses and consequent deflections, which would be due to the wheel loads if they were only static instead of being dynamic. Still, more serious is it, where the joints are open or down and the wheel loads drop upon the ends of the receiving rails one-eighth of an inch, one-fourth of an inch, or even more, for the rails must now support the shocks or impact of the wheel loads, the stresses and the consequent deflections in the rails being several times greater than those calculated for the static loads. We only need to recall the condition of the tracks a few years since to realize how serious were the impacts of even the much lighter wheel loads on the 4 and 4½-in. rails. The joints of the rails were not only greatly deflected under the passing trains, but the rails took a permanent set, the splice bars were bent, and the receiving ends of the rails cut out. The sums of the undulations per inch were double and often treble what they should be for the section of the rail under the present standards of maintenance of way.

The following experiments lately made at Scranton will illustrate the effect of a static load, suddenly applied loads, and the shock or impact of the same weight, falling upon a rail. A rail of an 80-lb. section, 30 ft. long was placed, at its extreme ends, upon rigid supports, having a scale pan of 210 lbs. suspended from the middle of the rail to receive weights.

The weight of the rail and scale pan deflected the rail in the center 0.852 in. This was the constant load and deflection for the subsequent experiments, the loads and deflection being in addition thereto. Secured to the center of the rail was an attachment carrying a pencil, which recorded upon a moving paper the deflections or vibrations of the rail, when the weights were applied.

One hundred pounds was now suddenly applied, the maximum deflection being 0.240 in., but when the rail ceased vibrating, the deflection for the static load of 100 lbs. was only 0.120 in., or only one-half of that for the same load when suddenly applied. The weight, 100 lbs., was now dropped from 12 in. height, the maximum deflection being 0.910 in. To produce approximately the same deflection by a static load required 650 lbs. added to the scale pan, or including the weight of 100 lbs., 750 lbs. After the 100 lbs. was dropped it required about 42 sec. for the rail to cease vibrating, and averaged about three vibrations per second.

Had these experiments been made from one end of a rail of 15 ft. in length, the other end firmly secured so as to prevent any deflection beyond the 15 ft., the deflections would have been much greater.

In service, even on the best maintained tracks, it is almost the effect of the suddenly-applied loads we are obliged to meet, for, as the speed of the train increases, we approximate the effect of suddenly-applied loads; while, where the joints are open, down, or the ties loose, we not only exceed the effect but reach the condition of shocks or impacts under wheel loads. We have ample experience to show what the effects of the wheel loads of 6,000 lbs. under cars, and 12,000 to 14,000 lbs., on drivers, were upon the rails a few years since. To withstand the effects of the common wheel loads of 11,000 lbs., and 18,000 to 20,000 lbs. on drivers now, we must not only have much stiffer rails than formerly but higher grades of steel.

The condensed diagrams of the Boston & Albany Railroad for 1894 show the excellent results of several years of systematic effort, in not only raising the standard of the track by labor, but by the adoption of the specially-made, high-carbon, 95-lb. rails for their service. Two hundred and seventy-five miles of the rails have been laid, the first noticeable effect being to reduce the average undulation per mile on the gradients to one-half its former amount, giving to the track a stability and smoothness never before attained. The results of service now indicate that they will be able to maintain the track so the comparison of the condition of track on the gradients and the level portions of the line will be nearly uniform. The rails at the mills were finished very smooth, the space between the supports on the anvils of the straightening presses being double those in former use, so the effect of gagging the rails rarely shows. The Boston & Albany Railroad Company put the high carbon rails on a firm basis of manufacture, by paying a higher

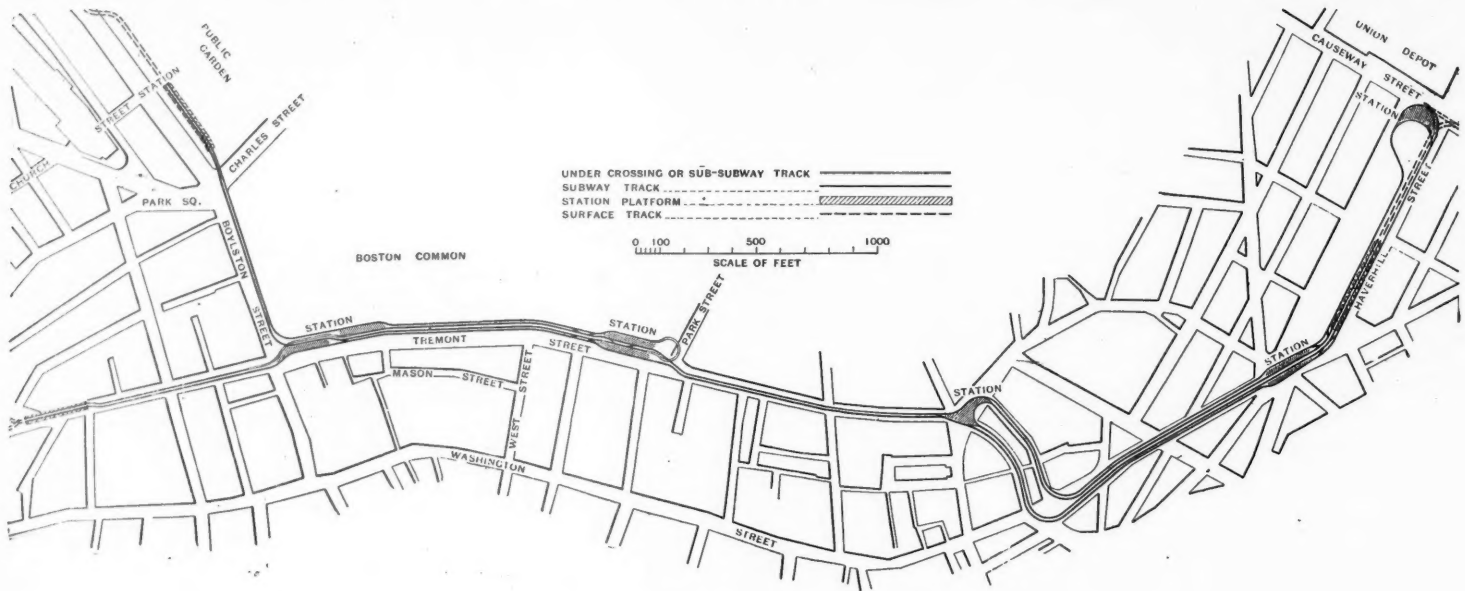
price for them at first; and this is one of the most important steps which have yet been taken to obtain steel for the present increased severity of service.

In the track the 95-lb. rails are much more stable than the former 72-lb. rails, and do not run on the gradients

many railroad officials have considered impossible of attainment. In good ballast, the 1891, 95-lb. rails show they can be surfaced to the low limit of the 15th line on the diagram for tangents, and to the 17th line for curves. To attain such a standard shows that the rails must hold

the least undulations yet recorded for 1891, 1892, 1893 and 1894.

These diagrams are the most important and instructive of the series, as they show the results attained by the use of the stiff and smooth 95-lb. rails, which give



Map Showing Route of Subway—Boston, Mass.

nearly as much, nor do they seem to be as quickly affected by the heat after they are in the track. The small movement on the splice bars shows that much less allowance for expansion would suffice; this seems true of all large sections after they are in the track. The saving in cutting of the ties under the heavy rails is very evident and will lessen the number of ties required annually for renewals.

There is much to be learned from the use of the heavy rails, for they have not only given a much greater stability to the track, but they are much easier maintained. The value of stiffness in rails can hardly be over-estimated, as the use of the 5 and 6-in. rails has fully demonstrated. The rails themselves should be able to absorb much of the work of the passing trains without disturbing the ties and ballast in a marked degree.

P. H. DUDLEY.

The diagrams referred to by Mr. Dudley are shown on the inset. We published a number of years ago similar diagrams showing the results of Mr. Dudley's inspection with the dynamograph car, but we believe that none so complete as these have ever before been printed except for private distribution. The construction of these diagrams is quite simple, but a little explanation will not be out of place.

The line marked "condition of track" represents the average sum of all the various undulations of rail, per mile, as summed up mechanically by the inspection apparatus, in feet and inches per mile. The diagrams show average undulations per rail per mile in hundredths of an inch, each horizontal line representing one one-hundredth. The lines are plotted therefore by taking as many horizontal spaces above the base line as will represent the average one-hundredths of an inch of undulations per mile. For each track the results are relative to the base line, but they are comparative, one mile with another. The average condition of each mile is indicated from the horizontal line touched by the "condition of track" line in the center of the mile space.

The line marked "age of steel" gives for each mile the time that the rails on that mile have been in track, each horizontal line representing one year. All of the steel three years old or less is the new 95-lb. rail, concerning which Mr. Dudley writes above.

The lines marked "percentage of tangent and curve" show the approximate alignment of both tracks per mile. The percentage of tangent is marked on the left side of the space for the mile, and that of the curvature on the right side. Each horizontal line represents 10 per cent. for the mile.

Lines marked "profile" show the gradients of the road, and are common to both tracks, though ascending grades on one track are descending upon the other, and vice versa. Each horizontal line represents 10 ft. of elevation, and refers to the base line for track No. 2 in all cases.

Lines marked "gage of track" read downward from the base, or 70th line, and show the amount the track is wide gage, each horizontal line representing one-tenth of an inch; a point projecting below the general average indicates that on some curves two or three rails are much wider than the rest, and usually will be found on the lower rails.

Lines marked "side irregularities of the rails," above the 70th line, represent the side irregularities of the rails, each horizontal line representing one-tenth of one inch. This line reads from the highest point in the center of the space for the mile. Three lines are about the best results which can be obtained.

This is the fourteenth year condensed diagrams have been made of the condition of the track, this year showing not only the highest standard yet secured, but one

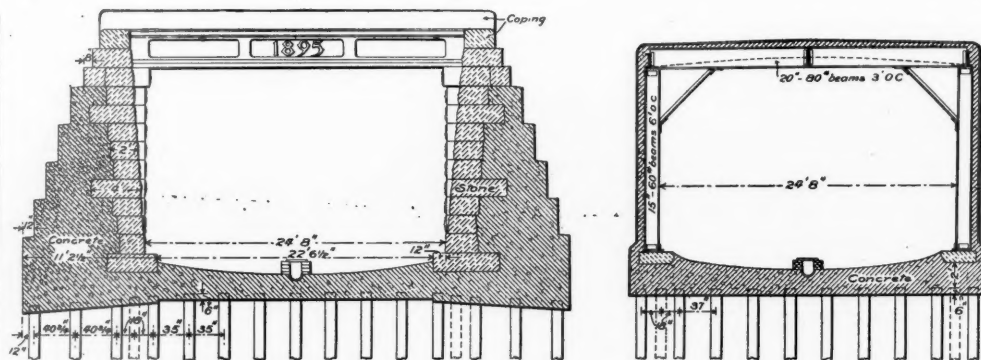


Fig. 1.—Entrance of Two-Track Subway, and Cross Section Near Foot of Incline.

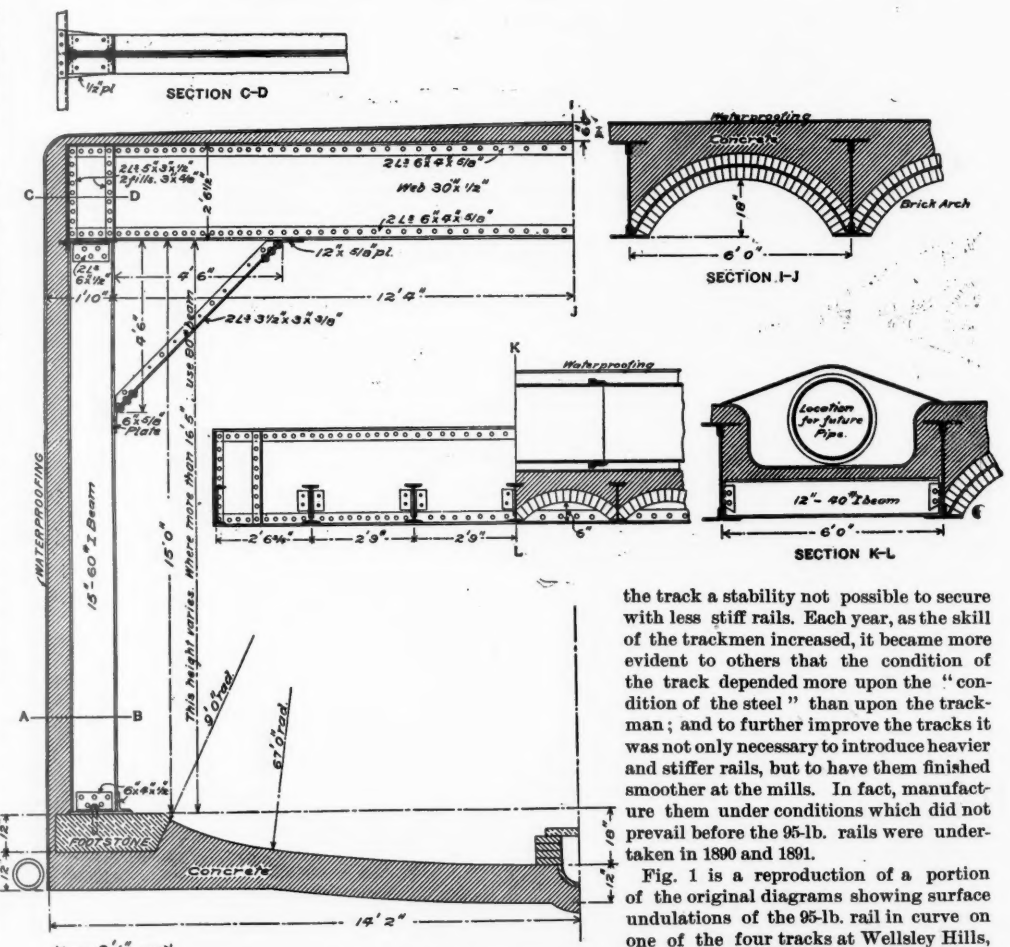


Fig. 3.—Details of Two-Track Subway.

practically the same stability the entire year. The stiffer the rails and the better the track, the smaller are the undulations. This is well illustrated on the diagrams, the 95-lb. rails showing

They show scarcely a trace of the hot-bed curves or of the joints. Mr. Dudley considers that these diagrams are indisputable proof of the improvement in the method of finishing the 95-lb. rail.

Fig. No. 2 is a portion of original diagrams of the surface undulations of 72-lb. rails in service 12 years in tan-

the track a stability not possible to secure with less stiff rails. Each year, as the skill of the trackmen increased, it became more evident to others that the condition of the track depended more upon the "condition of the steel" than upon the trackman; and to further improve the tracks it was not only necessary to introduce heavier and stiffer rails, but to have them finished smoother at the mills. In fact, manufacture them under conditions which did not prevail before the 95-lb. rails were undertaken in 1890 and 1891.

Fig. 1 is a reproduction of a portion of the original diagrams showing surface undulations of the 95-lb. rail in curve on one of the four tracks at Wellsley Hills, taken Oct. 17, 1894. The diagrams are considered to be typical of the surfacing on rails of the best finish now made.



gent at Charlton. The condition of the steel being as it is, the surfacing of the track is considered as good as could be expected. The receiving ends of the rails are badly worn and the surface wear is very uneven, due in part to the heavy gagging in the straightening presses during manufacture.

#### The Boston Subway.

We have noted before in these columns the beginning of work on Section 1 of the subway, now being built under Tremont, Boylston, and other streets, Boston, for

two tracks will be laid to Scollay square. These details are shown in the map. Additional tracks can only be built on Tremont street, between Park street and Scollay square, by means of a sub-subway under the original tunnel, or by following a new route. This, however, would not be necessary should Tremont street be widened between these points, as is proposed.

Fig. 2 shows a longitudinal section and plan of the two-track subway, along its center line. Careful provision is made for street pipe-laying at points at which streets cross the line of the subway. The proximity of

Manholes will be located every 100 ft. Side drain pipes will also be put in about as shown in the engravings, although their size and exact location will be at the discretion of the engineer, to be determined as the work progresses. The drains will lead to pump wells, from which the drain water will be drawn by electrically driven pumps. The  $\frac{3}{4}$ -in. waterproof coating over the entire outer surface of the subway, together with the concrete invert, will insure dryness in the tunnel.

The roof of the subway is to be composed of brick domes covered with concrete, and built in spans of about 6 ft. between transverse I-beams, or girders. The sides of the subway will consist of concrete arches, filled in between vertical I-beam posts. Fig. 3 shows the arrangement of the I-beams for overhead water pipe crossing, and the construction of the arched brick roof. The columns are all faced square at both ends before being put into place, so that good contact with horizontal plates may be secured. Where the subway is on a grade both the columns and roof girders are to be left vertical, the necessary variations being made in the bracing. This is shown in Fig. 4. Where necessary, tapered shims will be used between girders and posts.

The posts are of 15-in. 60-lb. I-beams, about 15 ft. long fitted with flanges at top and bottom. The base plates of the columns rest upon granite foot-stones, to which they are bolted by  $\frac{1}{2}$ -in. bolts, 6 in. long. The posts are spaced on an average, about 6 ft. c. to c., although, on account of curves, this varies somewhat. At every fourth post a joint in the longitudinal girders occurs. This joint has slotted holes to allow for expansion and contraction. The cross girders in this part of the tunnel are built up of 30-in.  $\times$   $\frac{1}{2}$ -in. webs, with two 5-in.  $\times$  3-in.  $\times$   $\frac{1}{2}$ -in. angles for the lower, and two 6-in.  $\times$  4-in.  $\times$   $\frac{1}{2}$ -in. angles for the upper chord. All rivets are  $\frac{3}{4}$  in. The flanges for the tops and bottoms of posts are of 6-in.  $\times$   $\frac{1}{2}$ -in. angles, riveted to the webs of the I-beam columns, with five  $\frac{3}{4}$ -in. rivets. A bracing of two 3 $\frac{1}{2}$ -in.  $\times$  3-in.  $\times$   $\frac{3}{8}$ -in. angles is put in at every other bay, as shown. The longitudinal beams, placed at pipe crossings, are 12-in. 40-lb. I-beams, spaced 2 ft. 9 in. c. to c.

Fig. 5 shows in detail a half cross-section and a longitudinal section of another part of the two-track subway, where I-beams are used for cross roof girders, instead of built-up girders. The longitudinal section shows the side-wall bracing between posts, which occurs only at every 8th bay. It is composed of 3-in.  $\times$   $\frac{3}{8}$ -in. angles, with  $\frac{3}{8}$ -in. gusset plates. The half cross-section here given is the half toward Boylston street. The construction of the side toward the Common differs from this somewhat.

A section of the four-track subway is shown in Fig. 6. This shows one of the center posts, which are built up of four 4-in.  $\times$  3-in.  $\times$   $\frac{3}{8}$ -in. angles, and one 10-in.  $\times$   $\frac{1}{2}$ -in. plate. These columns divide the four-track tunnel into two parts, the line of columns extending down its center. The longitudinal section shows the bracing between these center posts. This bracing occurs at every 8th bay, as between the side posts.

The excavation for the tunnel will be from the surface

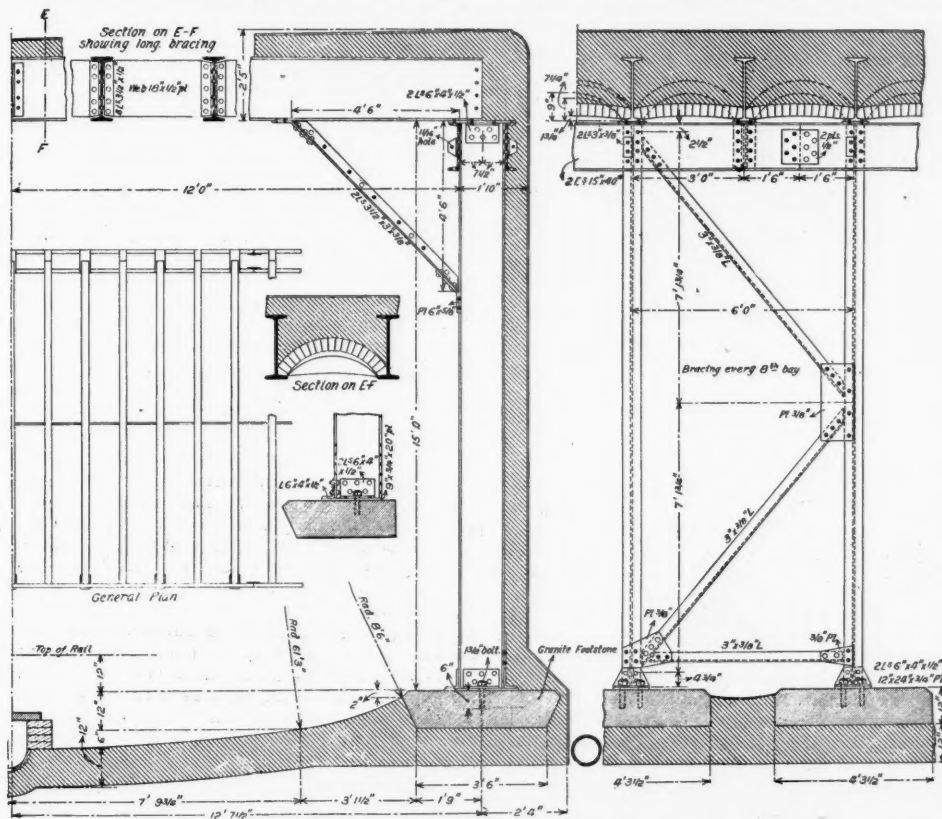


Fig. 5.—Half Cross Section and Longitudinal Section of Two-Track Subway.

the purpose of relieving the congested state of street traffic in the more densely populated and business parts of the city. We are now able to give detail drawings of this important work, which will be the first attempt in this country to provide underground "rapid transit" on a large scale for local passengers only.

The route of the subway is shown in the accompanying map. It extends from Shawmut avenue and Tremont street, down the latter to Boylston, thence under the mall of the Common to Park Street Church, and from here to Scollay Square, terminating at the Union station. There is a branch line from the corner of Boylston and Tremont streets, along Boylston street, to a point in the Public Garden, near Church street. At this point the tracks of the subway ascend to the surface by a 5 per cent. grade, the incline ending at Church street (see map).

The first section of the subway, that for which contracts have been let, begins at the inclined open entrance to the subway in the Public Garden near Church street, and extends under Charles street and along the Boylston street mall of the Common to a point about 160 ft. from Tremont street, also under the Tremont street mall of the Common, from a point about 110 ft. north of Mason street to a second point near the southerly line of West street.

The incline in the Public Garden is a masonry invert, with side retaining walls, its foundation resting upon spruce piles. This is shown in Fig. 1, which is at a point 318 ft. distant from that at which the tracks left the surface grade. Here the subway proper begins, the portal being shown in Fig. 1. The retaining walls are of heavy, rock-faced ashlar, backed with concrete, stepped on its rear face. The batter of the wall is 1 in. in 1 ft. The courses are 1 ft. 6 in. deep, with a coping of similar depth, as shown. The thickness of the retaining walls at the base is 11 ft.  $2\frac{1}{2}$  in., with a clear width between retaining walls of 24 ft. 8 in. at the elevation of the rail. The entire width of the structure is just under 45 ft. The bottom of the open incline, and of the tunnel, is of concrete, upon piles. The concrete under the side walls is laid horizontally in 30-ft. lengths, stepped off 18 in. at the end of each length to provide for the incline. Near the entrance of the incline, the wall, being lighter, is built upon concrete arches of 13-ft. span. There are, however, only five of these on each side. A gutter, with a flagstone covering, extends along the bottom of the subway, beginning at a manhole located in the open incline just outside the portal.

The structure will be two-track from the junction of Shawmut avenue and Tremont street to the station at Boylston and Tremont streets. The construction will be such, however, that two more tracks can be put in whenever it is made necessary by increased traffic. From Boylston street along Tremont, the subway will be four-tracked, as far as Park Street Church. From here, only

the roof of the tunnel to the street level makes it impossible to get sufficient depth for water mains without unusual provision. This is done, as shown at the crossing at Charles street, Fig. 2. The brick roof arches are omitted, and longitudinal I-beams put in their place, depressions being left in the concrete so that sufficient depth for pipe-laying may be secured. The plan in Fig.

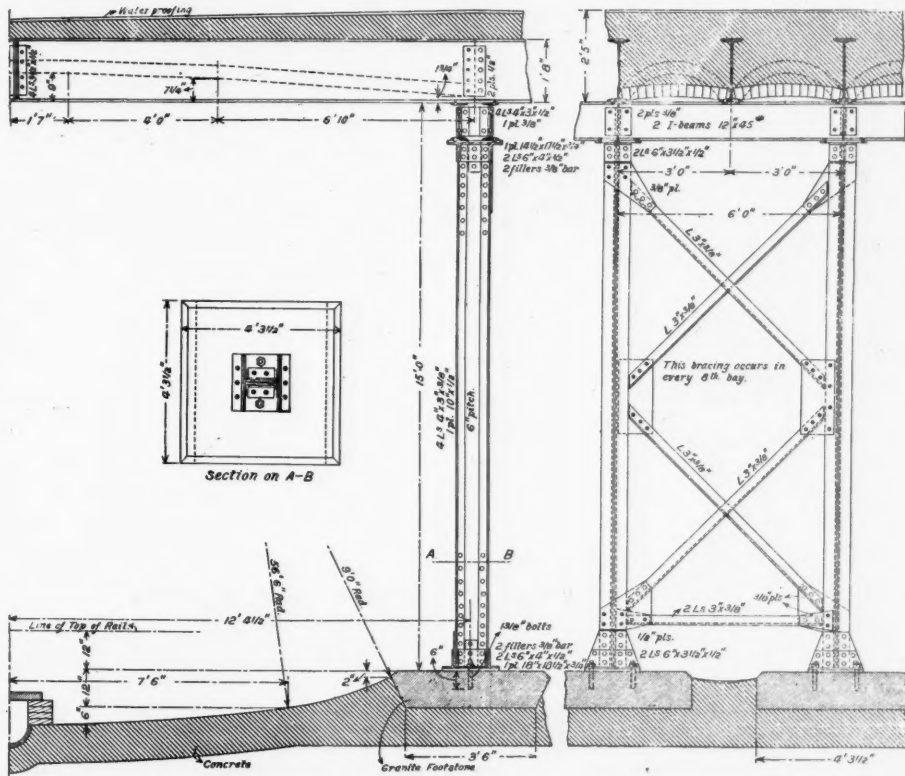


Fig. 6.—Section of Four-Track Subway, Showing Center Post.

2 shows the concrete walls of the tunnel sides, and the position of these I-beams in the roof.

The details of the construction of the two track subway are shown in Fig. 3. The drain extending along the bottom of the subway is a semi-circular 12-in. drain pipe, laid in Portland cement mortar, with four bricks, laid as headers, on either side of it, and covered with a flagstone. The side joints of this brick work will be without mortar.

by means of a trench. The length of this trench to be opened at any one time is to be no greater than is necessary for a vigorous prosecution of the work. As far as possible, a large core, or "dumpling," of the excavation will be left, to be removed after the sidewalks and roof of the subway are constructed. Sheet bracing will be used to prevent caving in of the side walls. This will be removed as the back filling is put in. Blasts in the trench

will be covered with heavy timbers chained together, to prevent accident. Excavations below sub-grade will be refilled with thin layers of gravel, wet and rammed, or, in some cases, with concrete or other masonry. The spaces between the piles and between pile caps and sills, will be filled up to the height of the under side of the timber platform on the piles. Excavation above subway grade will be filled in with a back filling of excavated material, in layers of not over 6 in., well wet and rammed, or settled through water if desired. Both Portland and American natural cement will be used in the masonry work. The mortar used will be

The inside joints of the side walls are to be pointed up, and the inside of the roof arches to be scraped and pointed, within three days after removing the centers.

Ventilation in the tunnel will be secured by ventilating fans, arranged in side chambers. Light will be provided by incandescent lamps fixed on brackets, and supplied by an electric plant installed for the purpose.

The specifications for the iron work include the following:

All material except shoe plates, separators, and brackets, which may be cast-iron where so shown, will be of steel, which may be either open hearth or Bessemer, pro-

pieces from each cast, and from each heating-furnace heat at least one test shall be made. The test pieces shall have an area of not less than one-half square inch. All uprights on girders which extend over the flange angles shall be made to fit closely to the horizontal legs of both flanges.

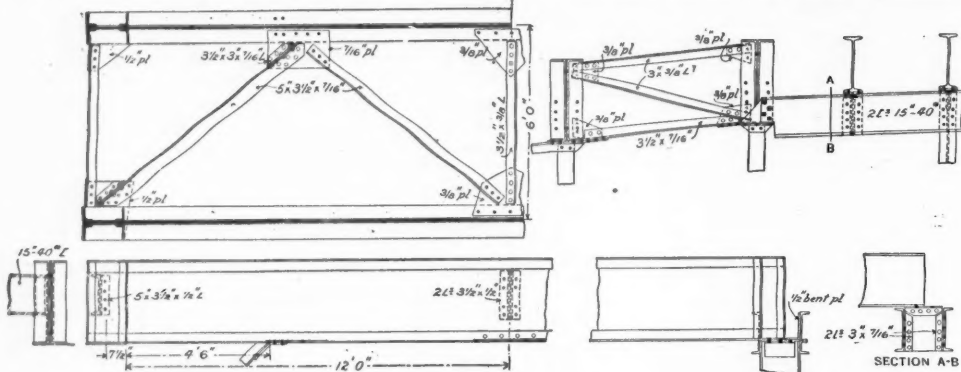


Fig. 4.—Details of Bracing.

one part by measure of Portland cement and two parts of sand, or, for American cement mortar used in the brick work, one part of cement to one and one-half parts of sand. The concrete is made by adding clean screened gravel to a cement of one part American cement and two parts sand in the proportion of one part cement, two sand, and not more than four and one-half of gravel in the finished mixture.

The stone work for the retaining walls of the inclined entrance to the subway will be of Quincy or other equally good granite, not more than one-third of the stones to be headers, to be not less than 2 ft. wide by 4 ft. long. Stretches may vary from 4 to 7 ft. in length and must be not less than 20 in. deep; the rise of each course will be 18 in., with a 1/8-in. limit for joints. The coping stones,

provided it satisfies the following requirements. All steel must be uniform in quality throughout, and the finished product must be free from flaws, cracks, ragged edges, or any other defects; must be straight and true to section, with a smooth and clean surface, and shall not contain in any part more than six one-hundredths of one per cent. of either phosphorus or sulphur, nor more than nine-tenths of one per cent. of manganese.

With the exception of rivets, all steel will be of "medium" grade. Specimens cut from finished material for test shall have an ultimate strength of from 60,000 to 68,000 lbs. per sq. in.; elastic limit not less than one-half the ultimate strength; minimum elongation not less than 20 per cent. in 8 inches; and a reduction of area at point of fracture of not less than 40 per cent. It shall

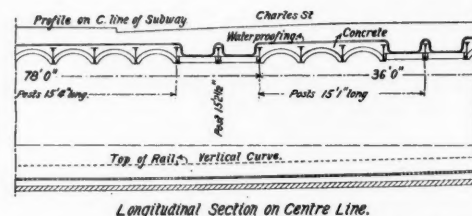
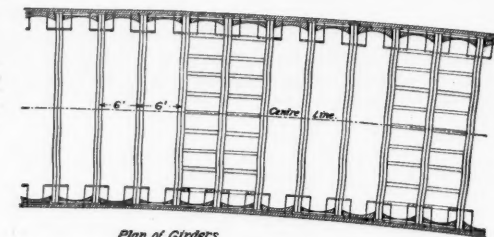
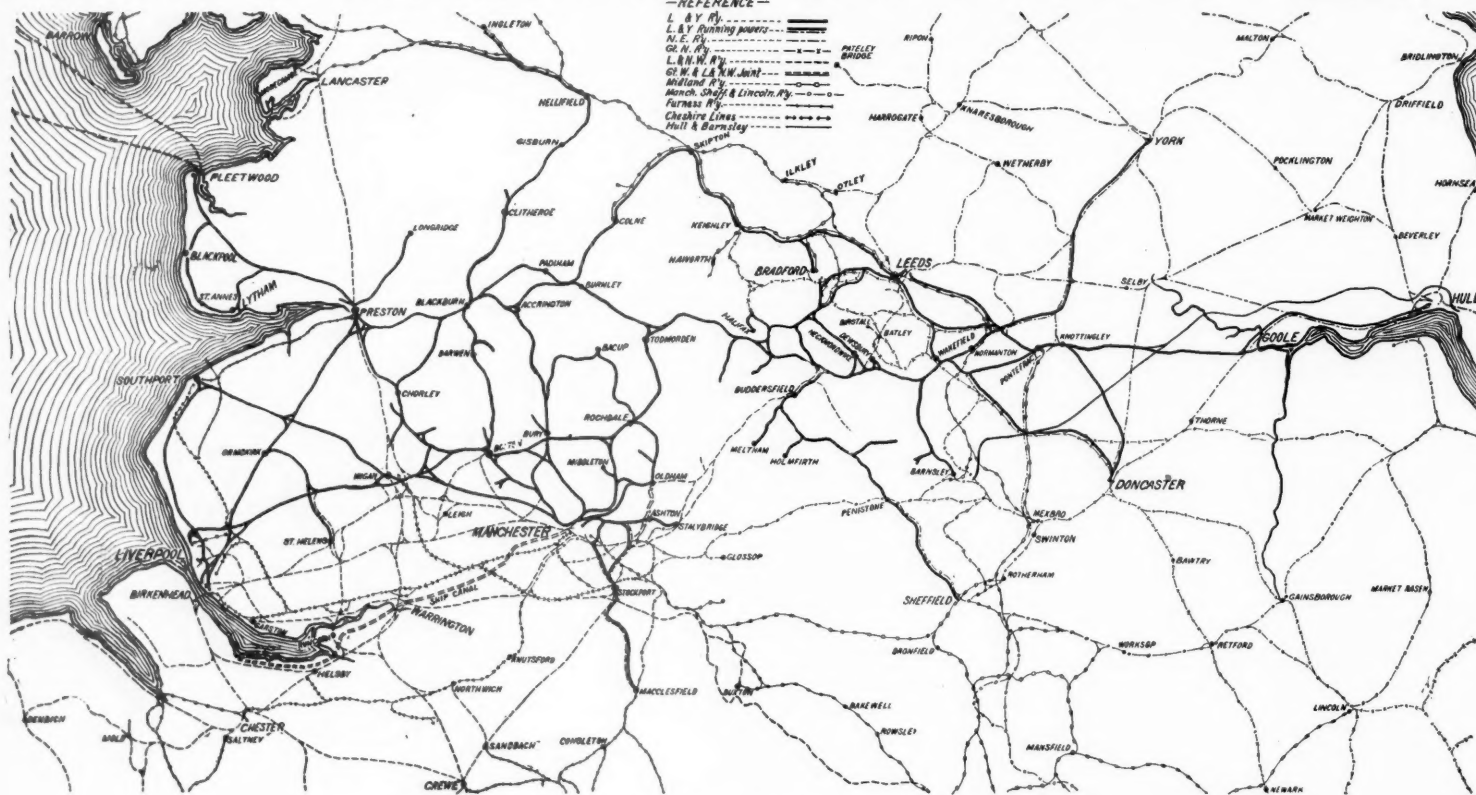


Fig. 2.—Plan and Longitudinal Section of Two-Track Subway

When the subway is constructed the columns and posts will be set and connected with masonry before the cross I-beams and girders are placed. It is therefore necessary that the holes in the I-beams and girders, necessary for such connection, shall be placed with great accuracy. An error greater than 1/2 of an inch, would cause the piece to be rejected.

Great care must be taken in handling the steel. The straightening after punching must be so conducted as to reduce risk of cracking to a minimum. Steel sections must not be hammered cold or worked at a black heat. When any part of a steel plate or section has to be heated for working the whole shall be afterwards annealed.

All surfaces inaccessible after assembling must be



MAP OF THE LANCASHIRE AND YORKSHIRE AND OTHER ENGLISH RAILROADS.

Showing Area Served by Certain "Joint Workings," and the Territory in which the L. & Y. Earns over \$43,000 a Mile, Gross.

will be at least 4 ft. in length, laid in Portland cement mortar.

The piles used in the foundation work will be of spruce, not less than 6 in. in diameter at the lower end and driven to a hard bottom. They must be at least 10 in. in diameter at the top after being cut off for capping. The pile cap and wooden platform upon the piles for the foundations of the subway will be of spruce timber. These pile caps are to be fastened to the piles by wrought iron drift bolts 8 in. longer than the thickness of the pile cap and of 3/4 in. diameter.

The drain pipes before mentioned, and shown in the engravings, are to be made tight enough at joints to prevent sand from passing into them. If necessary, the joints may be wound with thin cloth.

The waterproof covering for the outside of the subway, will consist of a smooth layer of roofing pitch, 3/4 in. thick, applied hot, and spread evenly over the surface.

bend cold 180 degs. to a diameter equal to the thickness of the test piece, without sign of fracture on the convex side of the curve.

Rivet steel shall have an ultimate strength of from 52,000 to 60,000 lbs. per sq. in.; elastic limit not less than one-half the ultimate strength; minimum elongation in 8 in., 26 per cent.; and reduction of area at point of fracture of 50 per cent. It shall bend cold 180 degs. flat on itself without sign of fracture on the convex side. When quenched from a low, cherry-red heat, in water at 70 degs. F., it shall bend 180 degs. around a diameter equal to the thickness of the piece without cracking.

All castings shall be tough gray iron, smooth and sound. Where necessary to secure perfectly flat and true surfaces, they shall be planed, but allowance shall be made in the patterns so that the specified thickness shall not be reduced.

Tests of the finished steel shall be made upon two

well painted with the best red-lead before being put together. Before leaving the shop the whole shall receive one coat of the same.

#### English Joint Railroad Lines.

Among other interesting lines of observation which those railroad officials fortunate enough to visit England this summer will have opportunity to follow out, is the working of joint lines. This is a field of research liable to yield good returns as applicable in various places in this country. Many things done and required by English customs will probably not fit here, but the main principle of a joint line for several railroads, to reach territory not otherwise feasible to attain, can probably be profitably applied to a much greater extent than it now is in this country.

A few instances that can be readily traced out from



railroad publications, time-table charts, etc., are as follows: Joint Lines of London & North Western (also joint large hotels) and Lancashire & Yorkshire at Preston. The Swinton and Knottingley joint line of the Midland and the North Eastern Railways. This is about 15 miles long, forming an important neutral connecting link between those two great systems. The Somerset and Dorset joint line of the Midland and the London & South Western from Bath to Bournemouth, 74 miles, is another instance.

The Cheshire Lines Committee System is, I imagine, the most extensive thing of this sort in all England, and a full and accurate description of this organization and the railroads interested in it would be valuable reading to many managers in this country. The Committees Lines aggregate about 140 miles and give access to Southport, Liverpool, Wigan, Manchester, Warrington, Chester and other important centers to two or three different railroad systems.

It is probable that there are many points in this country where similar enterprises would work to the great benefit of various systems in enabling them to reach important points, if each one will only drop the idea that it wants an exclusive entrance. At the same time, any one system is unwilling or unable to make the requisite investment alone; and, furthermore, what might be an unwarrantable outlay for one railroad interest alone, would perhaps be a paying investment if done for the use of two or three.

This attempt of the writer to touch upon the case may be much like the "Laird" in Trilby, who painted pic-

and the Lancashire & Yorkshire, which run in the aggregate over 60 trains a day each way. The Cheshire Lines Committee alone runs 17 trains each way at over 45 miles an hour. Another important part of the Committee's system is from Manchester to Wrexham via Chester. The Committee owns no locomotives, but something over 3,300 cars of all descriptions. We believe that the Manchester, Sheffield & Lincolnshire conducts the actual operations of transportation over the joint line.

#### International Railroad Congress.

The following is the complete programme of the excursions proposed by the London & North Western, Midland, Great Western, Lancashire & Yorkshire, and Great Northern Companies for Thursday, Friday and Saturday, June 27, 28 and 29 1895:

The Great Western Company will open for the inspection of visitors their locomotive and carriage and wagon works at Swindon, and also their Severn tunnel and the works in connection therewith.

The London & North Western Company will open for the inspection of the members of the Congress their locomotive works at Crewe, their carriage works at Wolverton, their wagon works at Earlestown, and their gravitation sidings and yards at Edge Hill.

The Midland Company will afford similar opportunities to visitors to inspect their locomotive, carriage and wagon works, and their large shunting sidings and other works at Derby and Beeston.

The Lancashire & Yorkshire Company will open their engine and carriage works at Horwich and Miles Platting, near Manchester.

In addition to the above the delegates and visitors may travel by trains of any of the companies to and from any other points or places of interest they may select. Railroad companies carrying to places south of London will give facil-

SATURDAY, June 29.—Return to London by Midland train at 3 p. m.

#### Great Western Railway.

THURSDAY, June 27.—Leave Paddington 9.30 a. m. Arrive Swindon, 11 a. m. Inspect locomotive works. Luncheon at 1.30 p. m. Inspect carriage and wagon works. Leave Swindon 4.45 p. m. Arrive Paddington 6.15 p. m.

FRIDAY, June 28.—Leave Paddington for Severn Tunnel 9.30 a. m. Visit the Severn Tunnel; inspect the works there, and take luncheon at Sudbrook. The party will then proceed by special train to Cardiff. Sleep at Cardiff.

SATURDAY, June 29.—Visit Rute Docks and Barry Docks. Luncheon at 1.30 p. m. Leave Cardiff 3.15 p. m. Arrive Paddington 7.15 p. m.

#### Lancashire & Yorkshire Company.

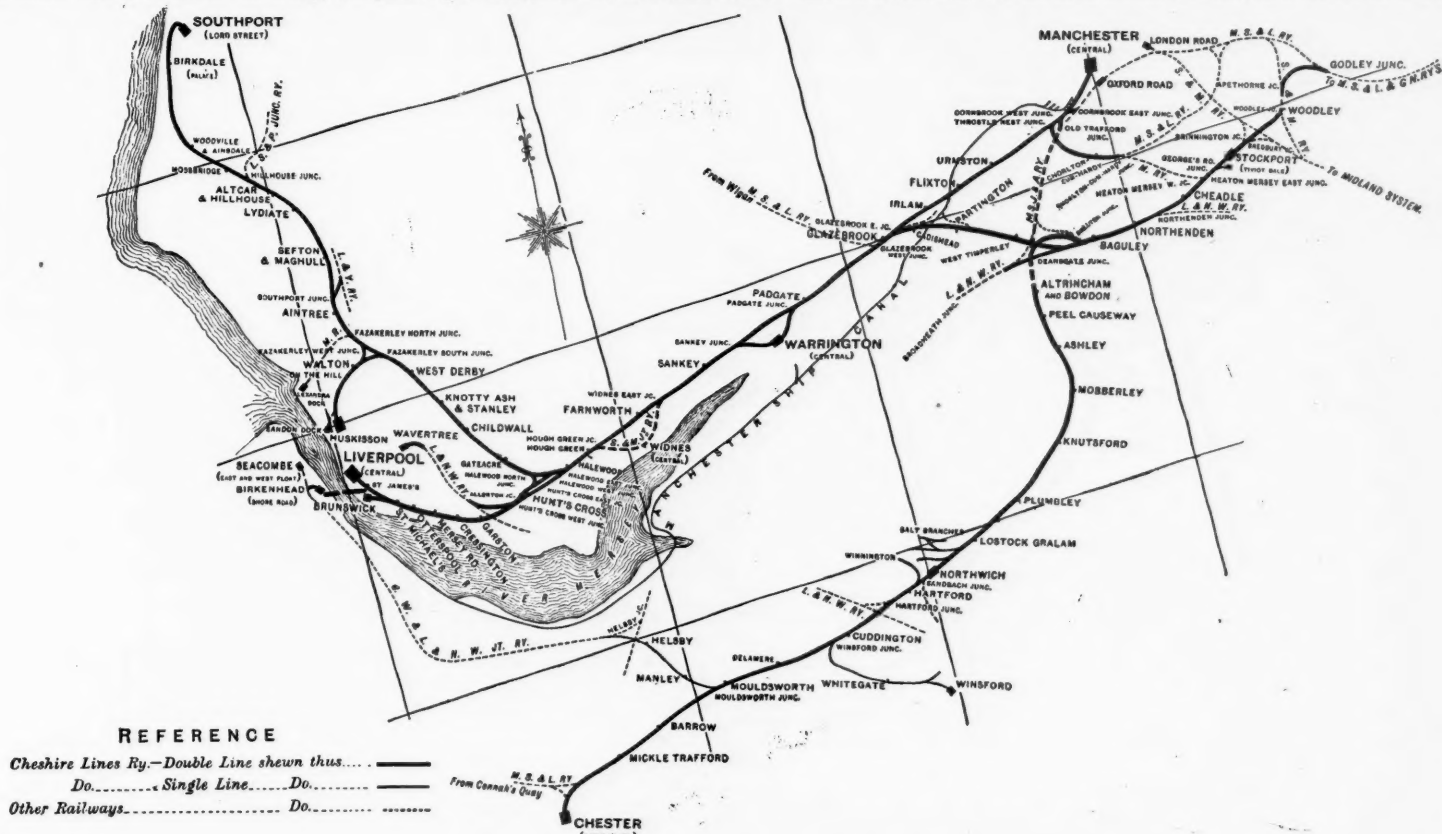
FRIDAY, June 28.—The visitors arriving at Manchester by the London & North Western Line from Crewe, and those arriving by Midland from Derby on the evening of the 27th, can in the morning visit the ship canal as far as Barton Viaduct, and leave Victoria station, Manchester, at 12.15 p. m.; leave Liverpool about 12 noon, for the Lancashire & Yorkshire Company's locomotive works at Horwich; inspect works, and return by Lancashire & Yorkshire special train to Liverpool. Luncheon will be provided at the works; sleep at Liverpool.

SATURDAY, June 29.—The party brought to Liverpool by the London & North Western Company from Crewe, and those brought by the Lancashire & Yorkshire from Horwich, may inspect the works of the Mersey tunnel, the overhead railway, and the docks and goods stations at Liverpool. Leave Liverpool (Central) by Midland train at 3 p. m.; arrive London at 8 p. m. Saturday.

Those visitors desiring to stay at any place of interest may alight and return by any train to London on Saturday or Sunday.

#### Great Northern Company.

THURSDAY, June 27.—To admit of a visit being made to the Annual Show of the Royal Agricultural Society of England this year, at Darlington, the Great Northern and Northeastern companies offer the following service should at least 50 visitors desire to avail themselves of it: Special express from



CHESHIRE LINES COMMITTEE'S RAILWAY SYSTEM, 1894.

Approximate 10 Mile Squares.

tures of scenes and countries of which he had no personal knowledge, but if some one to the "manor born" will pick up the thread of the subject, correct the writer's mistakes if any, as to the value of these joint lines and give substantial facts and figures to illustrate the case it cannot fail to interest many of your readers.

It would seem from general "map" knowledge that such joint lines well located giving two or more important individual railroad systems' entrance into large communities must be mutually beneficial to such communities and railroad systems.

D. P. E.

The Cheshire Lines Committee, which our correspondent refers to, is perhaps one of the most important examples of joint working to be found in Great Britain. It is composed of representatives of the Manchester, Sheffield & Lincolnshire, the Great Northern and the Midland, and was authorized 30 years ago. In 1867 it was incorporated as a separate undertaking Controlled by these three companies. It works 137 miles, but owns only about 16, we believe. The gross earnings of the committee were £806,284 in 1893. The passengers carried were 9,327,000, besides season ticket holders, and the tons of freight carried were 3,468,000. The total train-miles were 3,932,000. The most important part of the Committee's system probably, at any rate the part that gives it the bulk of its local traffic, is the 34 miles between Manchester and Liverpool, where a fine passenger service is run, the trains being frequent and fast. Some of the Americans who visit England this summer should make a special study of this passenger service—in fact of the service of the three competing lines between those two great cities, viz., the Cheshire Lines Committee, the London & North Western

ties and special excursion trains, if required, for delegates wishing to make week-end excursions, or to visit places of interest in the southern counties, particulars of which will be obtainable at the Imperial Institute after the opening of the Congress. The Northern companies will also offer facilities for excursions to various parts of Great Britain and Ireland, commencing on Wednesday, July 10, the day after the termination of the Congress.

The train arrangements to afford the members opportunities of seeing the foregoing are as follows:

#### London & North Western Railway.

THURSDAY, June 27, 1895.—Leave Euston at 8.30 a. m. Arrive Crewe at 11.45 a. m. Inspect locomotive works. Luncheon at 1 p. m. Leave Crewe for Liverpool at 5 p. m. Leave Crewe for Manchester at 5.10 p. m.

The visitors have the option of staying at either place on the night of the 27th. Those staying at Liverpool can on FRIDAY, June 28—Leave Liverpool (L. & N. W. Ry.) 8.45 a. m., arrive Edge Hill 8.50 a. m.; inspect system of shunting by gravitation from the series of gridiron sidings; leave Edge Hill 10.20 a. m., arrive Earlestown 10.50 a. m.; inspect wagon works; luncheon provided at 1.00 p. m.; leave Earlestown 2.00 p. m.; arrive London 6.15 p. m.

Those traveling to Manchester and staying there can on Friday, June 28, make an excursion along the ship canal and afterward visit the Lancashire and Yorkshire Company's locomotive works at Horwich as detailed under the Midland Company's arrangements. If the visitors prefer to stay at Liverpool they can return on Saturday, the 29th, from Liverpool (Central Station) by Midland Company's train. In addition to the above, visitors who stay in London on the 27th can inspect Crewe works on the 28th, leaving London at 8.30 a. m. and returning the same night.

SATURDAY, June 29.—The London and North Western Company will convey visitors to their carriage works at Wolverton and back as under: Leave London (Euston) 9 a. m., arrive Wolverton, 11.10 a. m.; inspect works. Luncheon at 1.15 p. m. Leave Wolverton 3 p. m., arrive Euston 4.15 p. m.

#### Midland Company.

THURSDAY, June 27.—Leave St. Pancras at 9.15 a. m., arrive Beeston at 12 noon. Inspect works; arrive Derby, 1 p. m. Luncheon will be provided on arrival at Derby. Inspect locomotive, carriage, wagon and signal works, and the large coal sidings in the neighborhood can then be inspected. Leave Derby for Manchester or Liverpool at 4.47, 7 or 8.30 p. m., as the visitors may select. Visitors staying at Liverpool on the 27th can inspect the Mersey tunnel, docks, overhead railway and other works, and on Friday, the 28th, go to Horwich by the Lancashire & Yorkshire Company's train, leaving Liverpool at —

London—Leave King's Cross 8.30 a. m. Arrive York 12.15 noon. Luncheon will be provided at York station. Leave York 12.45 p. m. Arrive Darlington 1.45 p. m. Conveyances will be ready to take visitors to show ground. Leave Darlington 5.30 p. m. Arrive York 6.30 p. m. Dinner will be provided at York station. Leave York 7 p. m. Arrive King's Cross 10.45 p. m.

When at Darlington an opportunity will be given for the visitors to see the first locomotive engine ever used on any railway for drawing passenger carriages. The Secretary of the Royal Agricultural Society has said the Council will be much pleased to issue to members of the Congress orders for admission to the show.

#### Debs to be Imprisoned for Contempt.

The Supreme Court of the United States has sustained the Circuit Court (Judge Woods) in punishing E. V. Debs and several other officers of the American Railway Union by imprisonment (Debs one year, the others six months) for contempt in disobeying the order of the court, in July, 1894, forbidding obstruction of trains at Chicago and elsewhere. The main portions of the opinion of the court (which was unanimous) were as follows:

(1.) What are the relations of the general government to interstate commerce and the transportation of the mails? They are those of direct supervision, control and management. While the nation is properly styled a government of enumerated powers, yet within the limits of such enumeration it has all the attributes of sovereignty, and in the exercise of those enumerated powers acts directly upon the citizen, and not through the intermediate agency of the state.

(2.) Under the power vested in Congress to establish post offices and post roads, Congress has by a mass of legislation established the great post system of the country with penalties for all offenses against it. If the inhabitants of a single state or a great body of them, should combine to obstruct interstate commerce or the transportation of the mails, prosecutions for such offenses had in such a community would be doomed in advance to failure. And if the certainty of such

failure was known, and the national government had no other way to enforce the freedom of interstate commerce and the transportation of the mails than by prosecution and punishment for interference therewith the whole interests of the nation in these respects would be at the absolute mercy of a portion of the inhabitants of a single state. But there is no such impotency in the national government. The entire strength of the nation may be used to enforce in any part of the land the full and free exercise of all national powers and the security of all rights entrusted by the constitution to its care.

In the case before us, the right to use force does not exclude the right of appeal to the courts for a judicial determination and for the exercise of all their powers of prevention. Neither can it be doubted that the government has such an interest in the subject matter as enables it to appear as plaintiff in this suit. It is said that equity only interferes for the protection of property, and that the government has no property interest. A sufficient reply is that the United States have a property in the mails, the protection of which was one of the purposes of this bill. Every government, intrusted by the very terms of its being with powers and duties to be exercised and discharged for the general welfare, has a right to apply to its own courts for any proper assistance in the exercise of the one and the discharge of the other, and it is no sufficient answer to its appeal to one of those courts that it has no pecuniary interest in the matter.

The national government, given by the Constitution power to regulate interstate commerce, has by express statute assumed jurisdiction over such commerce when carried upon railroads. It is charged, therefore, with the duty of keeping those highways of interstate commerce free from obstruction, for it has always been recognized as one of the powers and duties of a government to remove obstructions from the highways under its control.

It is said that the jurisdiction heretofore exercised by the national government over highways has been in respect to waterways only; but the fact that in recent years interstate commerce has come mainly to be carried on by railroads has in no manner narrowed the scope of the constitutional provision. It is said that seldom have the courts assumed jurisdiction to restrain by injunction in suits brought by the government, either state or national, obstructions to highways, either artificial or natural. This is undoubtedly true, but the reason is that the necessity for such interference has only been occasional.

That the bill filed in this case disclosed special facts calling for the exercise of the powers of the court is not open to question.

It is objected that it is outside of the jurisdiction of a court of equity to enjoin the commission of crimes. This, as a general proposition, is unquestioned. A chancellor has no criminal jurisdiction. But the law is full of instances in which the same act may give rise to a civil action and a criminal prosecution. The acts of the defendants may or may not have been violations of the criminal law. If they were, that matter is for inquiry in other proceedings. The complaint made against them in this is of disobedience to an order of a civil court, made for the protection of property and the security of rights.

This bill was not simply to enjoin a mob and mob violence. It was not a bill to command a keeping of the peace; much less was its purport to restrain the defendants from abandoning whatever employment they were engaged in. The right of any laborer, or any number of laborers, to quit work was not challenged.

Summing up our conclusions, we hold that the Government of the United States is one having jurisdiction over every foot of soil within its territory and acting directly upon each citizen; that, while it is a government of enumerated powers, it has within the limits of those powers all the attributes of sovereignty; that to it is committed a power over interstate commerce and the transmission of the mail; that the powers thus conferred upon the national government are not dormant, but have been assumed and put into practical exercise by the legislation of Congress; that in the exercise of those powers it is competent for the nation to remove all obstructions upon highways, natural or artificial, to the passage of interstate commerce or the carrying of the mail; that, while it may be competent for the Government (through the executive branch and in the use of the entire executive power of the nation) to forcibly remove all such obstructions, it is equally within its competency to appeal to the civil courts for an inquiry and determination as to the existence and character of any alleged obstructions, and if such were found to exist, or threaten to occur, to invoke the powers of those courts to remove or restrain such obstructions; that the jurisdiction of courts to interfere in such matters by injunction is one recognized from ancient times and by indubitable authority; that such jurisdiction is not ousted by the fact that the obstructions are accompanied by or consist of acts in themselves violations of the criminal law; that the proceeding by injunction is of a civil character and may be enforced by proceedings in contempt; that the penalty for a violation of such injunction is no substitute for and defense to a prosecution for any criminal offenses committed in the course of such violations; that the complaint filed in this case clearly showed an existing obstruction of artificial highways for the passage of interstate commerce and the transmission of the mail, an obstruction not only temporarily existing, but threatening to continue; that under such complaint the Circuit Court had power to issue its process of injunction; that, it having been issued and served on these defendants, the Circuit Court had authority to inquire whether its orders had been disobeyed, and when it found that they had been, then to proceed under Section 725, Revised Statutes, which grants power to "punish, by fine or imprisonment, . . . disobedience, . . . by any party . . . or other person, to any lawful writ, process, order, rule, decree, or command," and enter the order of punishment complained of, and, finally, that, the Circuit Court, having full jurisdiction in the premises, its finding of the fact of disobedience is not open to review of habeas corpus in this or any other court.

We enter into no examination of the act of July 2, 1890, upon which the Circuit Court relied mainly to sustain its jurisdiction. It must not be understood from this that we dissent from the conclusions of that court in reference to the scope of the act, but simply that we prefer to rest our judgment on the broader ground which has been discussed in this opinion, believing it of importance that the principles underlying it should be fully stated and affirmed.

The petition for a writ of habeas corpus is denied.

#### Coal Storage Plant at Port Richmond, Philadelphia.

The Dodge Coal Storage Company, of Nicetown, Pa., is just finishing a very extensive and complete coal storage plant, having a capacity of 180,000 tons, for the Philadelphia & Reading Railroad. It is being erected at

Port Richmond, just north of the present storage yards of the railroad company.

The Dodge system of handling, storing and reloading the coal is a simple one. From the time the car is run over the hopper into which it is unloaded until the coal is reloaded in the cars for shipment there is no shoveling, and no handling is required other than the raking up of a thin layer of coal that is left upon the ground, when it is desired to use the floor for coal of a different size. The handling is done by means of scraping conveyers using the well-known Dodge chains, and though the height of the center of the pile may be, as in the case under consideration, more than 70 ft., the coal need never be allowed to fall more than from 12 in. to 15 in., so that there is practically no breakage whatever.

Ordinarily the coal is stored in conical piles, but there

Byron street on the north, the Philadelphia & Reading tracks on the east, thus closing Bath street and the rear end of the lots fronting on Melvale street to the west. The total dimensions within the enclosure are: Length, 1594.4 feet, and breadth 335 feet from the center of the unloading track. The arrangement of switches, main tracks and sidings for the yard is clearly shown by our engraving (Fig. 1). From this and the photograph it will be seen that provision is made for the formation of six piles; the two at the end will have a capacity of 20,000 tons each; the intermediate piles a capacity of 40,000 tons each, and the center piles a capacity of 30,000 tons each. It is usually customary to place one reloader for each two piles; but in this case, in order to expedite the reloading for shipment, four reloaders are used, and these are so disposed that each of the 40,000-ton piles can be

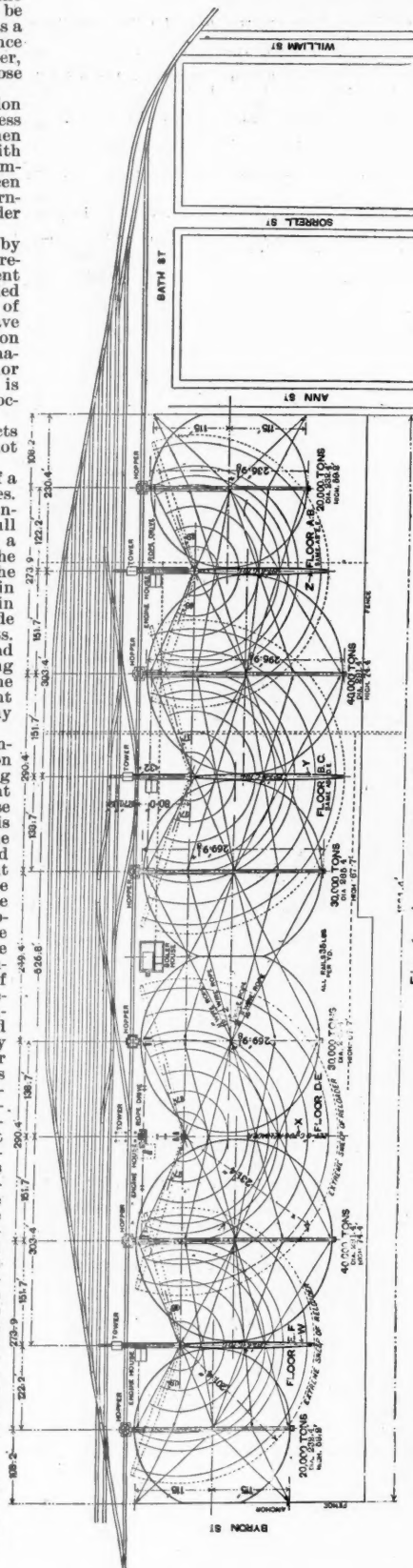


Fig. 1.—Arrangement of Tracks and Yard.

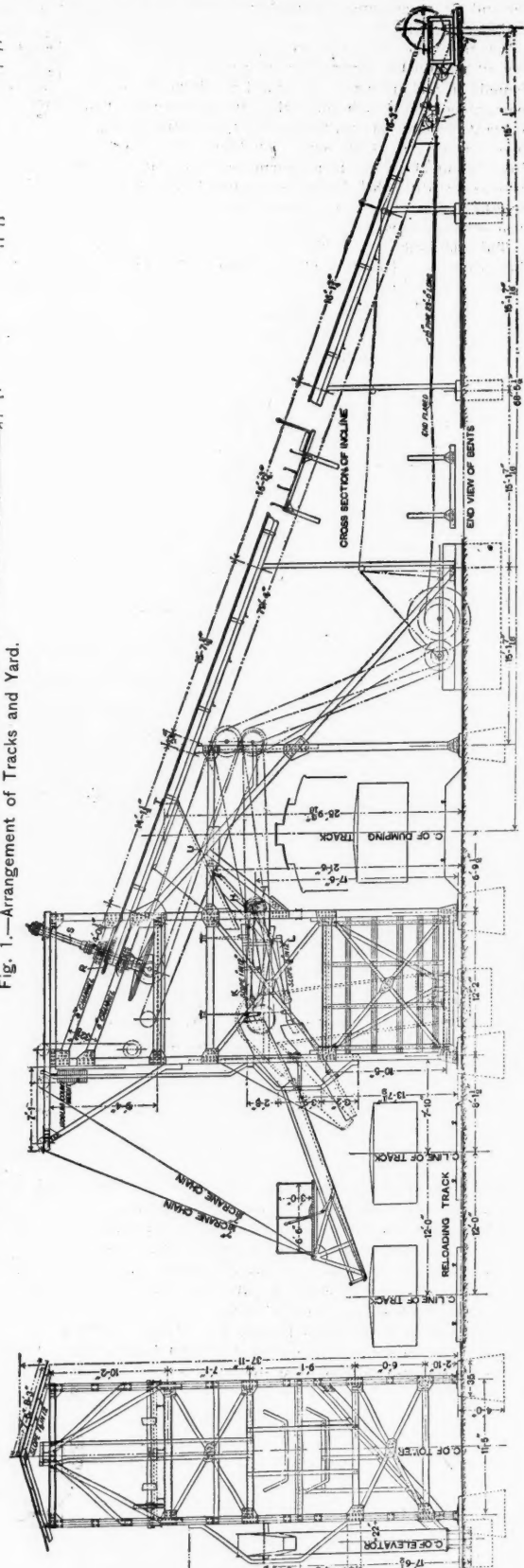


Fig. 3.—General Arrangement of Reloading Tower and Conveyor.

have been cases where a very much greater storage capacity was desired than the ground room available would permit were conical piles alone to be used, and where an ingeniously braced enclosure was introduced that practically placed a cylinder of coal of the height of the enclosure and of the diameter of the pile beneath the conical portion. Such a system was used at the West Superior plant erected for the Lehigh Valley Railroad.

The general appearance of the plant is well shown by the half-tone reproduction of a photograph taken after the trimmers had been put in place, and while the buildings and other iron work was still in course of erection. The photograph was taken from the southeastern extremity of the plant, looking toward the opposite diagonal corner. The plot of ground that has been set aside for this purpose lies between Ann street on the south

attacked from opposite sides at the same time. It is expected that the capacity of these reloaders will be 3 tons each per minute. When the plant is started, or when the reloaders are not at work, they stand out at right angles from the towers which they supply, so that they may not be buried under the coal, and it is in this position that they are shown in Fig. 1, being marked W, X, Y and Z. The heavy outside circles that are concentric with the center of the trimmers indicate the outside limits of the bottoms of the several piles; the circles in fine lines concentric with the heel or pivot of the reloaders are the rails upon which they (the reloaders) run, and the straight lines leading from the centers of the trimmers are the guy lines holding them in a vertical position. The location of the boiler-house, engine-house, hoppers and to wens are also clearly shown



The steam plant consists of two 150 H. P. boilers placed in a house located on the transverse center line of the plant, and from which the steam is piped to the several engines. The furnaces are designed for burning screenings and dust on the McClave grates with steam blowers that have been so successfully used in the anthracite mining regions for burning culm. In each of the four engine-houses there is a 100-H. P. engine for driving the machinery.

In Fig. 2 we have an outline of the trimmers. The trusses are so designed that a certain number of bents at each end are standard, so that they are available for use with any span of trimmer that is likely to be erected, the intermediate bents being put in as the occasion may demand. It will be noticed that the angle made by the trimmer girders with the horizontal is about 27 deg. The contractors have found, as the result of their experience, that this is nearer the angle at which loose coal will stand than 30 deg., as is usually given in text and pocketbooks for the angle at which coal begins to move.

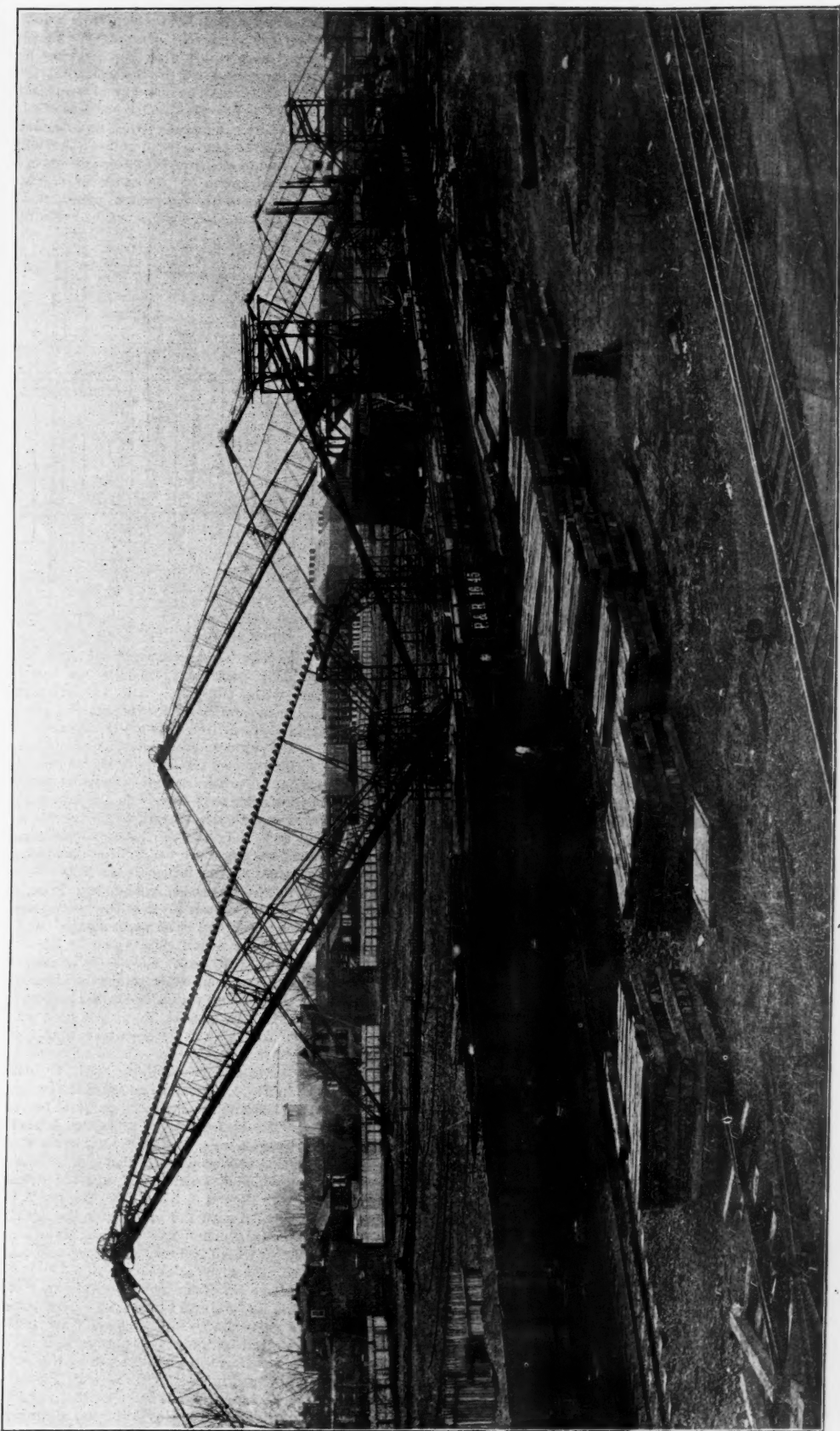
The system of storing the coal is very simple. Beneath the entering track, and directly in a line with the center line of the trimmer, as shown in Fig. 1, there is a hopper into which the cars are dumped, and which has a capacity sufficient to take the whole load of the car. A chute in the bottom of the hopper, controlled by a sliding door, delivers the coal by gravity into the foot of the inclined trough that leads to the top of the trimmer. In this trough the scraping conveyor works, its course being indicated in Fig. 2. Starting with its load at the bottom of the hopper, between the rails, it moves up through the trough to the apex of the trimmer, returns along the line indicated above the bents, passes over the idle pulleys *M* and *N* (Fig. 2), and thence to the foot of the incline. The driving pulley of the conveyor is at the top of the trimmer, and it is in turn driven by a rope leading off from pulleys in the nearest engine-house. Thus the pull is at the delivery end of the loaded chain.

We have said that the system is so designed that the coal need never be allowed to fall more than from 12 in. to 15 in. in the plant. This would, of course, be impossible were it carried to the apex of the trimmer before it were allowed to fall to the floor below. To obviate this difficulty and secure the desired end, that portion of the conveyor trough which is on the trimmer proper is left open at the bottom from a point near that indicated as *P*. Thus, when commencing operations with an empty floor, the coal drops out at this point and starts the pile. Beneath the tower *Q* carrying the rope-drive, and below the bottom line of the trough, there is a reel upon which a steel ribbon  $\frac{3}{4}$  in. thick and 12 in. wide is rolled. The end of this ribbon can be drawn out and up by means of a windlass and a wire rope to the apex of the trimmer. Therefore when the pile has reached to within about a foot of the discharge opening, this ribbon is run out, and forming an extension to the bottom of the conveyor trough, it carries the point of discharge out and up, the process being repeated until the pile is completed and the floor full. These conveyers are to run at a speed of 200 ft. per minute, and will have a capacity of 3 tons per minute.

The pivot end of the reloader consists of an arm varying in length according to the size of the pile to be attacked, as given in the dimensions marked on Fig. 1; the arm is pivoted at one end and rests upon small flangeless wheels running upon the circular rails, weighing in this case 35 lbs. to the yard. The reloading arm is swung by means of anchor lines that run along the outside of one of the rails near the outer extremity, and which are firmly anchored to the ground just outside the extreme throw, which ranges through an arc of 204 deg. These anchor lines pass over pulleys properly located, and then pass through a length of gas pipe to a point near the center. This pipe is used to do away with sag, and the sheaves are so adjusted as to keep the length of the hauling lines as nearly constant as possible. The conveyor is an open-side scraper conveyor operated with a Dodge chain and cutting into the side and foot of the coal pile. The operator stands on the pivot platform, and by means of hand-wheels controls the motion of the conveyor and the swinging of the reloader. The operation is apparently simple: The hauling line is drawn in until the conveyor bottom cuts into the pile and the scrapers bring the coal up to the center, and then as the supply falls off the reloader is swung in more and more until the whole pile is removed. The skill in handling lies in the prevention of a downfall and consequent burying of the reloader. While the natural quiescent inclination of a coal pile is about 27

deg., when that same coal has been subjected to a compression of a superincumbent weight, and the pile is eaten into from the bottom, that same coal may stand at a very much steeper angle, and this may result in an

up the incline shown coming down to the right in Fig. 3. The conveyor chain passes around the sprocket wheel *R* that is keyed to the inclined shaft *S*, while the coal has already been delivered at the point *T* lower down the



Philadelphia & Reading Coal Storage Plant at Port Richmond, Pa., in Course of Construction.

avalanche when the foundation has been sufficiently cut away. The skill of the operator is made manifest by the alertness of eye by which he detects the first symptoms of a coming fall, and backs the reloader out of the way. When the coal leaves the reloading arm it is carried

slope into the inclined trough *U*. This trough has a n inclination of 6 in 12 that causes the coal to flow rapidly and freely into the upper shaking screen *K*, which is given 131 vibrations a minute by the eccentric *H*, to which it is attached by means of a long eccentric rod. The coal escaping from the end of this screen drops upon an incline of 1 in 2 and thence into an adjustable chute for delivery into the cars on the outer shipping track. This chute is slung by suspending chains from a bracket on the tower, and is raised or lowered by the man in charge on the platform, where his lever is shown. Reference to the engraving, Fig. 3, will show that there is a gate at the foot of the chute controlled by the lever, so that the flow of coal to the car can be temporarily stopped without stopping the conveyor itself.

The coal that drops through the screen *K* falls upon the screen *L*, which also has an oscillating motion of 131 vibrations per minute from the eccentric *I*. The coal is delivered into a chute and falls into cars on the loading track next the towers, and which is marked *G* in Fig. 1. Each tower, therefore, screens and delivers two sizes of coal to the cars. The dust falls into a bin occupying the whole base of the tower, and from which it is taken through a suitable opening. This will be the fuel used under the boilers of the plant, and the excess will be removed by hand to cars and hauled away.

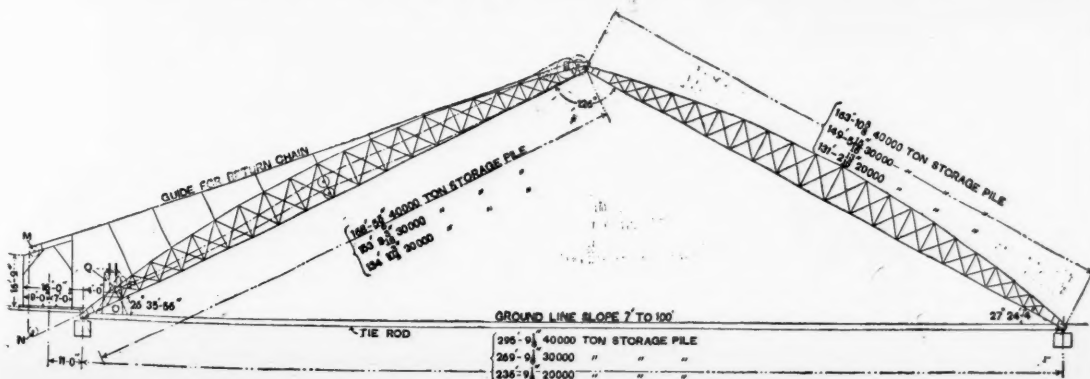


Fig. 2.—General Design of Trimmers.



The whole of the structural work of the plant is of steel, and the work has been most thoroughly done. The engines are coupled direct to the main line of shafting and this is cut up and subdivided by friction and tooth clutches, so that each and every moving part can be handled independently of all of the others. The system has been in use for a number of years, and is being widely introduced by coal handlers who find it necessary to store large tonnage. Among other large plants that have been erected, there is one at West Superior (See *Railroad Gazette*, October 26, 1894), which has a capacity of 100,000 tons on two floors; one at South Amboy with a capacity of 190,000 tons on 16 floors; and another at South Plainfield of 310,000 tons in 14 piles.

#### Railroad Legislation in Tennessee.

The Legislature of Tennessee that has recently adjourned passed a new tax law of about 20,000 words, embodied in 117 sections, that makes marked changes in the methods of making assessments. All real estate is to be assessed biennially, beginning with 1896, instead of annually as now. Personal property is assessed annually.

Stocks in corporations are assessed at their market value and at not less than their full actual value. The actual stock of any corporation that is invested in the business is all that is assessed. Every corporation, except bank, trust, insurance or investment companies "shall pay an ad valorem tax upon the full value of its corporate property, which in no case shall be held or deemed to be less than the actual value of all its shares of stock, together with the actual value of its bonded indebtedness." (Sec. 5.)

"... In assessing quasi-public corporations, such as street railroads, etc., and all other corporations public in their character, a reduction shall be given for the value of real estate assessed in wards, districts or counties other than the district ward or county in which said corporation is located." (Sec. 16.)

"... All incorporated companies owning property in this and any other state shall be assessed upon the full value of its corporate property held and owned in this state, which in no case shall be held or deemed to be less than the proportionate value of all its shares of stock, together with the actual value of its bonded indebtedness; and the value of the property of the corporation in each county shall not be assessed at less value than its relative value of the entire value of the property of the corporation as capitalized and bonded, and the intangible property actually in or arising from operations in each county shall be included in the valuation of the property in each county, and only such intangible property as is actually in or arising from operations in the domicile county shall be included in the valuation of the property in such county. And such corporation shall furnish the assessor with a sworn statement showing: The total outstanding bonds and shares of stock, the actual value of each, the relative value of their property in this state and in each county in this state, including the amount of intangible property actually in or arising from operations in each county in this state. . . ." (Sec. 17.)

"... No ad valorem tax shall be assessed upon the property of any corporation organized under the laws of any other state or county, except such as may be within this state."

"... Shares of stock in corporations, all the property of which is taxable to the corporation itself, shall not be assessed to the shareholder." By Section 21, franchises and privileges granted are declared to be property.

By Section 60, a State Board of Assessors and Equalizers, consisting of three freeholders who have been residents of the state 10 years, are to be appointed by the legislature, one at each biennial session to serve for six years. The full Board is first to be selected by the Secretary of State, Comptroller of the Treasury, and Treasurer. They each are to give bond of \$25,000. They assess "the distributable and localized property of all railroad, telegraph and telephone companies for the year 1896, and after that biennially." They are to assess the localized property of railroad, telephone and telegraph companies in the same manner provided for the assessment of individuals by county assessors. Every second year they shall personally inspect the "localized and distributable property of said corporations." They are to take memoranda during such inspections, and, upon these and the schedules, base the assessments.

Section 64 says "... It shall be the duty of the State Board of Assessors or Equalizers to make a study of the laws of this state and other states, and embody the result of each investigation in the report of their other labors to the Governor before each sitting of the General Assembly."

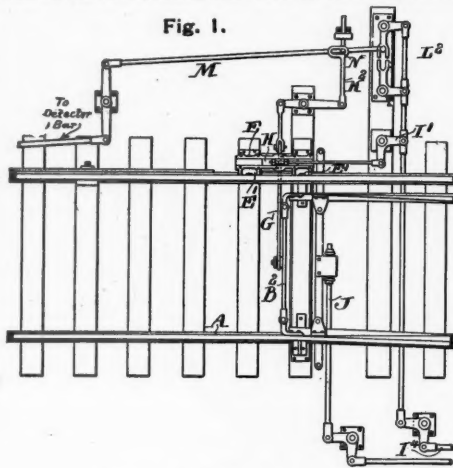
The law is in some respects crude, and there are contradictions in some particulars, but it is believed that it will change the existing order of things for the better. It will now permit foreign manufacturing corporations which desire to establish branch works in Tennessee to do so without danger of being compelled to pay taxes on the entire capitalization of their organization, as was possible under the old law.

#### Turner's Facing Point Lock.

The drawings shown herewith illustrate a facing point lock recently patented by Mr. J. J. Turner, Superintendent of the Pittsburgh division of the Pittsburgh, Cincinnati, Chicago & St. Louis, his main object being to avoid the danger of setting a wrong signal at safety when a switch connection breaks. This

device has been found to work well in service and one is now in use at Richmond, Ind. We understand that it will be adopted as standard on the Pennsylvania lines west of Pittsburgh, and that ordinary facing point locks will be taken out as fast as possible.

Where switches and signals are thrown from a distant point (as a tower) it is impossible, of course, for the operator to know from observation that the switches have responded to the impulse given by the actuating lever, and in order that there may be no doubt about it, the "facing point lock" is provided, which consists of a bolt actuated from the tower, generally by a separate lever. This lock is located at the switch points; the bolt is fastened to a tie, and in either of the two positions of the switch it registers with one or the other of two holes in a bar which moves with the switch points, and in order to throw a switch, this bolt must be withdrawn



Turner's Facing Point Lock.

from the hole. If, in any movement the switch points move only part way, neither of the holes will register with the bolt, and an attempt to throw the lock lever will be ineffectual and the dangerous position of the switch rails made apparent. This device has been thought to give entire safety, but one or two recent accidents have shown a need for more thorough protection. A break in any of the parts actuating the switch points after they have left the first position, and before arriving at the second, will leave the points in mid-throw, and the bolt of the lock will not register; but if the break has occurred before the switch points have been moved at all, the lock bolt is left free to enter the hole that it has just been withdrawn from, while the position of the switch lever in the tower, and the fact that the lock lever can be thrown, makes the leverman believe that the switch points are in the second position. Again, the lock shows only that the switch points have taken their proper position with reference to the casting which holds the locking bolt; while they may or may not be in proper position with the stock rail, to which it is essential that they fit closely.

A general view of a switch equipped with Mr. Turner's lock is shown in Fig. 1. The rod *J* actuates the switch and *I* actuates the lock and the detector bar. Each movement of the detector bar is from or to a position beneath the level of the top of the rail, so that the bar never remains in a fixed position above the rail. The lock is in an iron trough or box which is shown at *E*, and the details of this are shown in Figs. 2, 3, 4, 5 and 6. The rod *I* moves the plate *H* parallel with the track and the locking is effected by an engagement between this plate and the transverse bar *G*, which is fixed to *B*<sup>2</sup>, the rod connecting the switch rails with each other.

Fig. 2 is a plan view of the lock; Fig. 3 is an elevation of Fig. 2 on the line *xx* and Fig. 4 is an elevation on the line *yy*. The parts shown in Figs. 5 and 6 are indicated by the letters given in the previous paragraph, all of the lettering being uniform in the different drawings.

Referring now to Fig. 4, it will be seen that a plate is fixed to the bottom of box *E* and that this plate has a slot *F*<sup>2</sup> registering with the slot *E*<sup>2</sup> in the sliding plate. The braces *E*<sup>1</sup>, Fig. 2, hold the lock firmly to the stock rail, so that any displacement of the latter will prevent locking the switch and thus give warning to the signalman. Mr. Turner has a separate patent on this detail. It will be seen by Fig. 5 that the bar *G* has two notches; the sliding plate *H* has two lugs on its under side, *H*<sup>2</sup> and *H*<sup>3</sup> (Fig. 6), and each lug can enter only its corresponding notch.

The lock connection, which acts through the crank *I*<sup>1</sup>, also moves two clutches, one of which is shown engaging the end of rod *M* (Fig. 1), and the detector bar is moved by means of one or the other of these clutches. It will be seen that the bell cranks are so arranged that the clutches never move simultaneously in the same direction; they register only when, as in the illustration, the switch is unlocked. Mr. Turner has a second patent on this detail. By means of the rod *K*<sup>2</sup>, and the connection *N*, every movement of the switch rails changes the detector bar rod *M* from one clutch to the other.

As this movement will be readily understood by signalmen who follow the connections, we have omitted the rest of the lettering shown on the original drawings. It will be seen that the lock and detector bar connection *I* is actuated by a three-position lever, and that with the rod in the position shown in the drawing the

lever must be standing in its central position. If the signalman pushes *I*<sup>1</sup> he pulls on the lock plate and locks the rod *G* by means of the lug *H*<sup>3</sup> (Fig. 6). At the same time he moves the detector bar by pulling lever *M*. If, instead of pushing, he pulls *I*<sup>1</sup>, he locks the switch by means of the lug *H*<sup>2</sup> (Fig. 6). With the switch in the other position and rod *M* engaging the other clutch, the detector bar is moved precisely as in the first instance; for while in one case *M* is pulled by pushing *I*<sup>1</sup>, in the other it is pulled by pulling *I*<sup>1</sup>.

If the signalman should attempt to set the switch for the side track, but fail to move the rails by reason of a breakage in the rod *J*, and then proceed to clear the signal for the side track, on the assumption that the switch rails had been moved, he would of course first try to lock the switch in the new position; but he would be unable to do this because the lug *H*<sup>2</sup> would not register with either notch in rod *G*; and with the switch not locked the interlocking in the tower would prevent clearing the signal and compel attention to the failure of rod *J*.

#### Traffic Through the Soo Canal.

Maj. O. M. Poe has made up the statistics of the freight passing through the St. Mary's Falls Canal last year, portions of which are published as below. By making computations of the figures reported by the masters of the vessels Major Poe is enabled to calculate the average rate per ton per mile for the whole journey performed by each shipment and it appears that the average rate per ton per mile was .99 mill. This is about 10 per cent. less than the average in 1893 and is a little more than one-half the lowest rate per ton per mile which is known to have been received by a railroad for carrying freight voluntarily; that is, for freight which the company could have readily refused, if it had believed the price to be below cost, without materially injuring its standing with shippers as a competitor for the traffic. We refer to the grain recently carried by rail from Buffalo to New York at 1.8 mills per ton per mile.

Colonel Poe's report gives the total quantities of freight as follows:

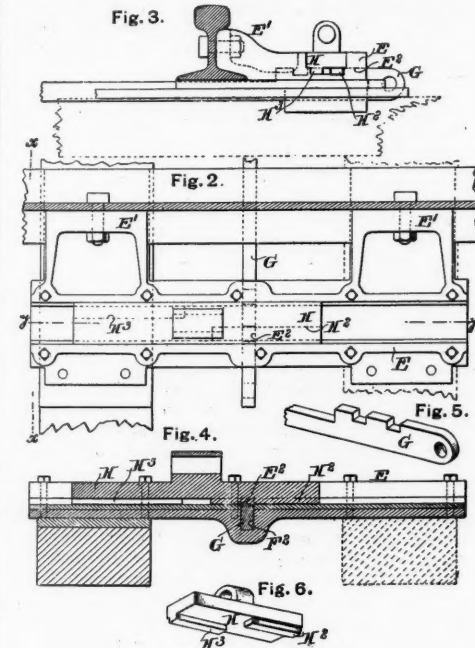
	Quantity.
Coal, net tons.....	2,787,174
Flour, bbls.....	8,965,773
Wheat, bus.....	34,869,483
Iron ore, net tons.....	6,518,876
Lumber, M ft.....	722,788
Miscel. mds.....	451,185

The total amount of freight paid, \$10,798,310, divided by the total ton miles, 10,927,871,324, gives the cost per ton mile as  $\frac{23}{100}$  mills. The average length of haul was 828.1 miles, which is 3.8 miles less than in 1893. This data includes the cost of loading and unloading.

A summary of craft using the canal during the season follows:

Total number of registered craft.....	814
Total passages by unregistered craft.....	172
Total freight carried by registered craft.....	13,177,612
Total freight carried by unregistered craft.....	18,248
Total passengers.....	27,236
Total valuation of craft registered.....	\$13,081,000

The Canadian freight amounted to 460,684 tons, which is  $\frac{3}{5}$  per cent. of the total freight for the season. The



Turner's Facing Point Lock.

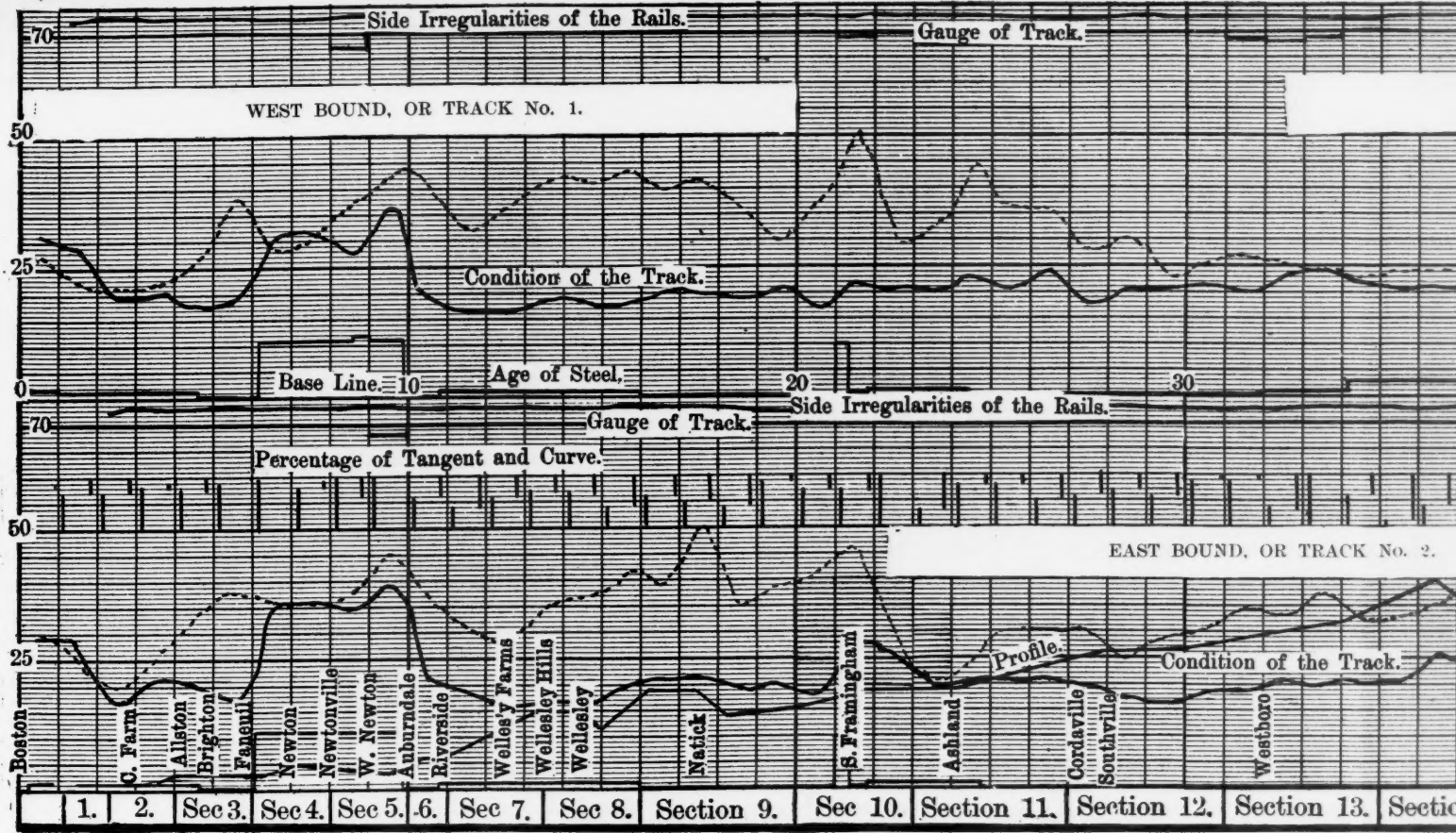
total passages for the season amounted to 14,491, and 2,011 of these were by 76 craft under 100 tons register. Their aggregate registered tonnage was 1,976 tons and their average tonnage 26 tons. The freight carried by these craft during the season only amounted to 83 tons.

The canal was open to navigation during the season of 1894 234 days, which is an increase of 15 days in comparison with 1893. The freight carried during the season of 1894 amounted to 13,195,860 net tons, which is an increase of 2,309,288 net tons in comparison with the season of 1893, or an increase of 23 per cent.

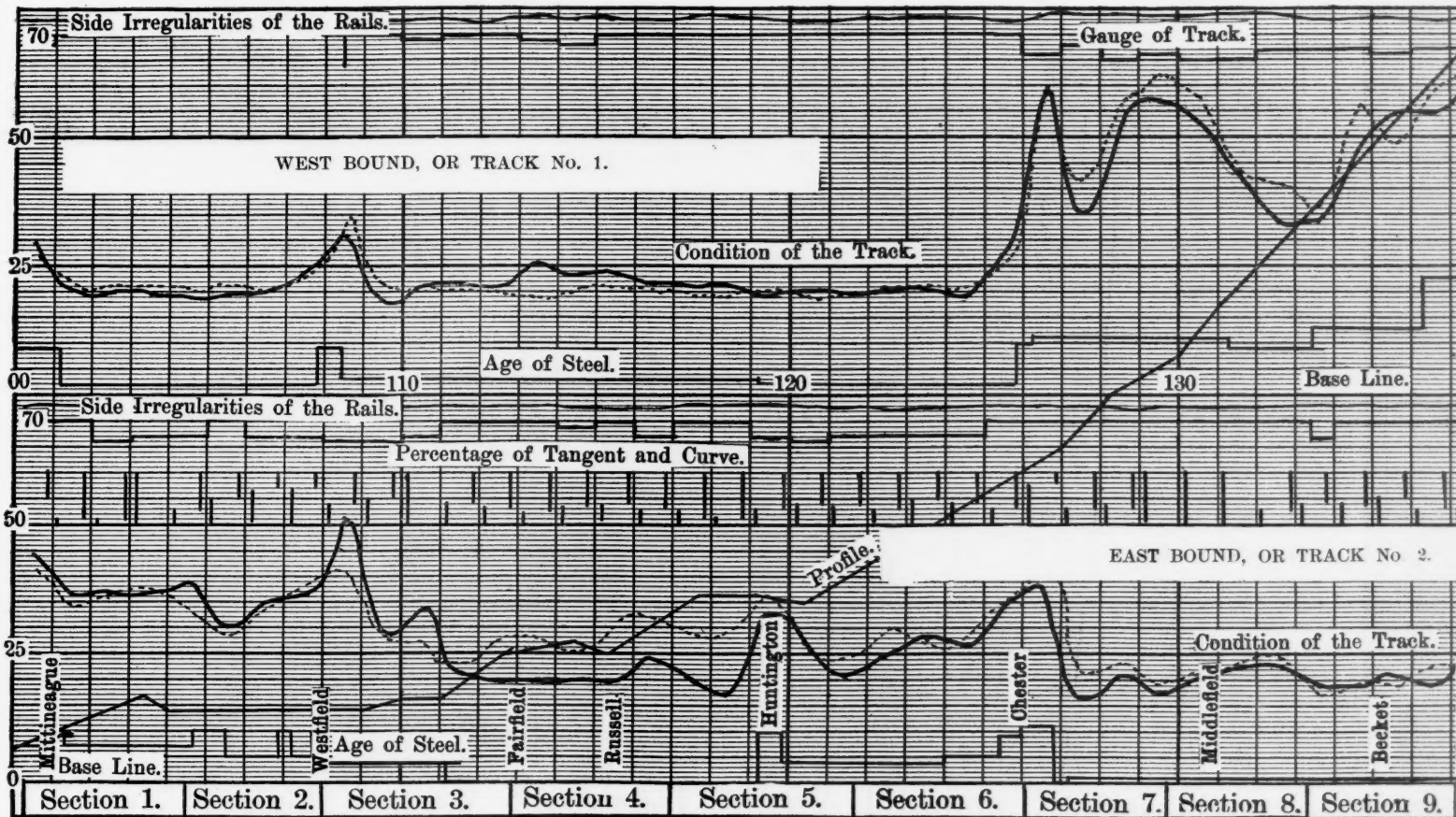
The greatest number of miles run during the season is again to the credit of the steamer Mataoa, of the Minnesota line, Cleveland, and amounted to 48,663 miles. This boat earned the same credit last season. The greatest amount of freight carried during the season is to the credit of the steamer Maritana, of the same line, aggregating 94,640 net tons, and the greatest number of ton-miles for the season is to the credit of the same boat and is 77,985,016. The largest single cargo carried during the season is to the credit of the steamer S. S. Curry, Cleveland, and amounted to 3,758 net tons. The largest single cargo carried by a sail vessel is to the credit of the tow-barge Sagamore, Cleveland, and amounted to 3,286 net tons. This barge earned the same credit during the season previous.

There were seven steamers that carried in their largest





Division No. 1, Boston to Worcester. Wm. Parker, Division Engineer; C. B. Lentell, Roadmaster.



Division No. 3, Springfield to 153 Mile Post. T. J. Sullivan, Roadmaster.

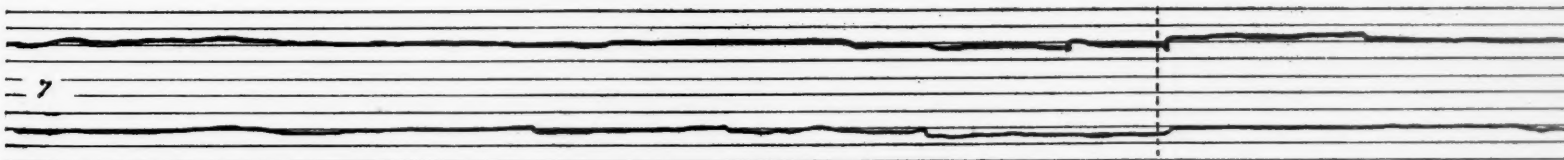
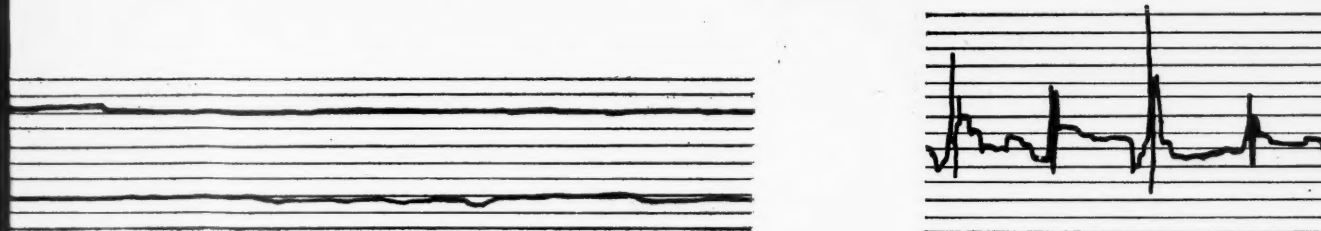
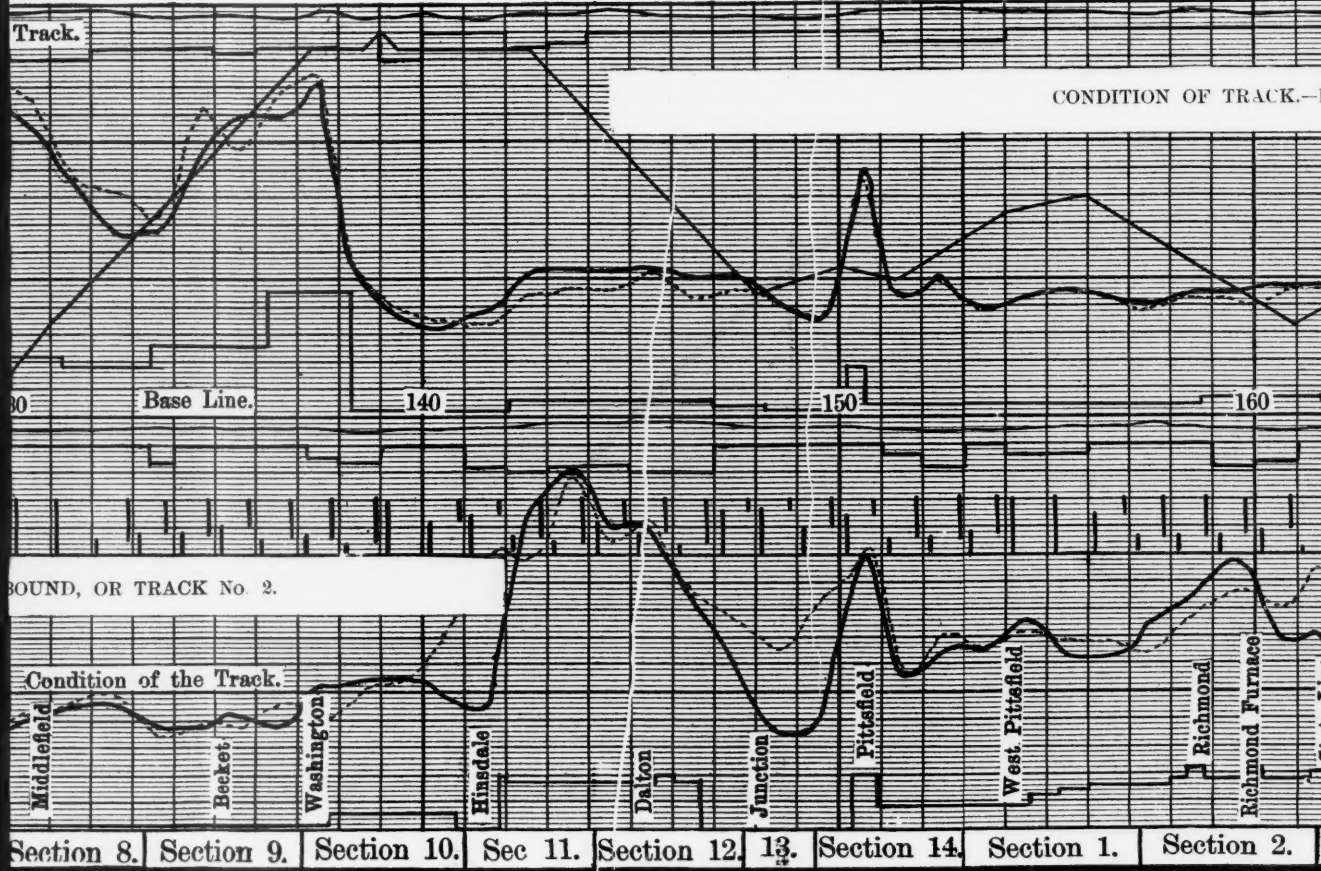
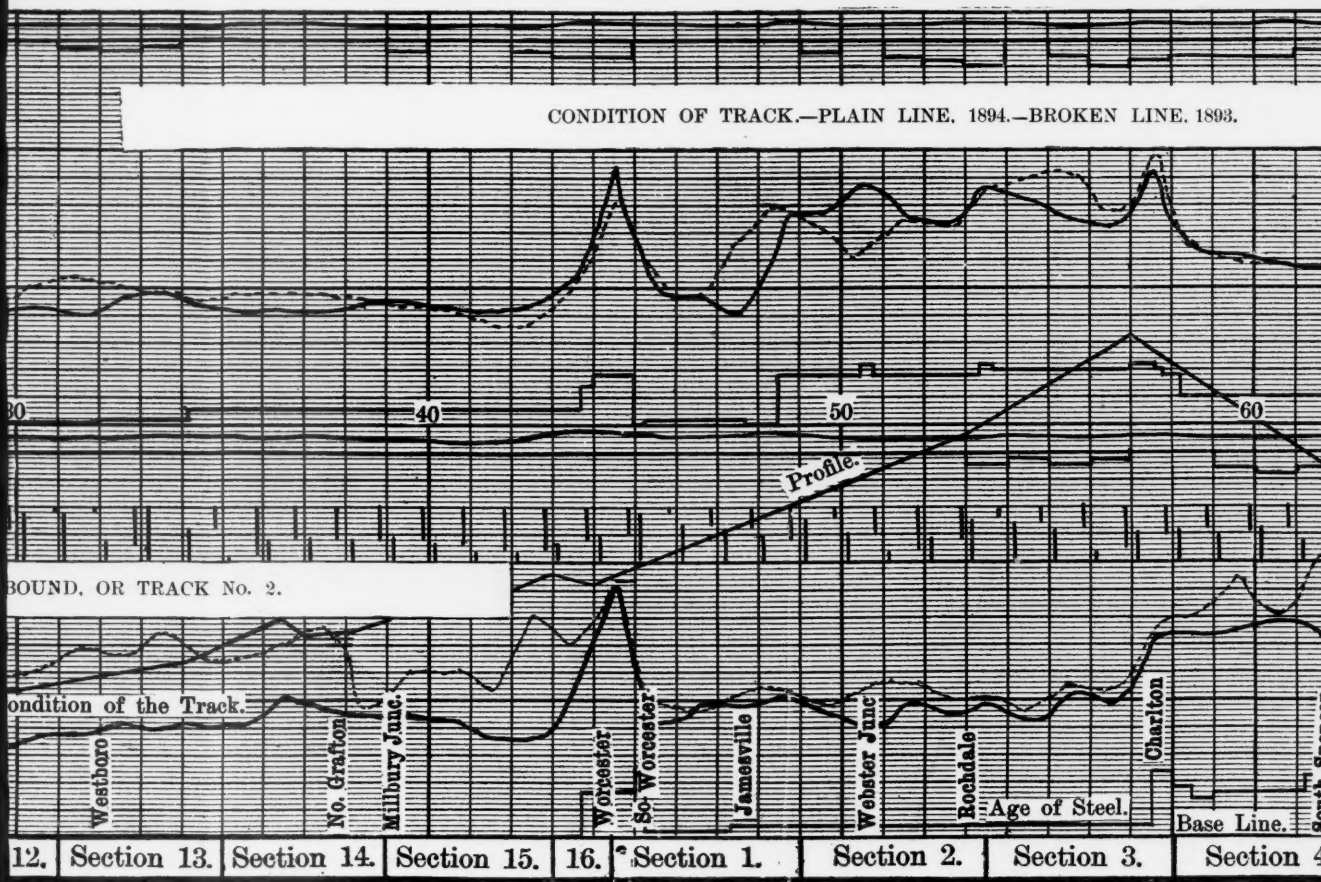


Fig. 1—Surface Undulations, 95-lb Rails.

TRACK D

WILLIAM H. RUSSELL, CONSULTING ENGINEER; WALTER SHEPHERD



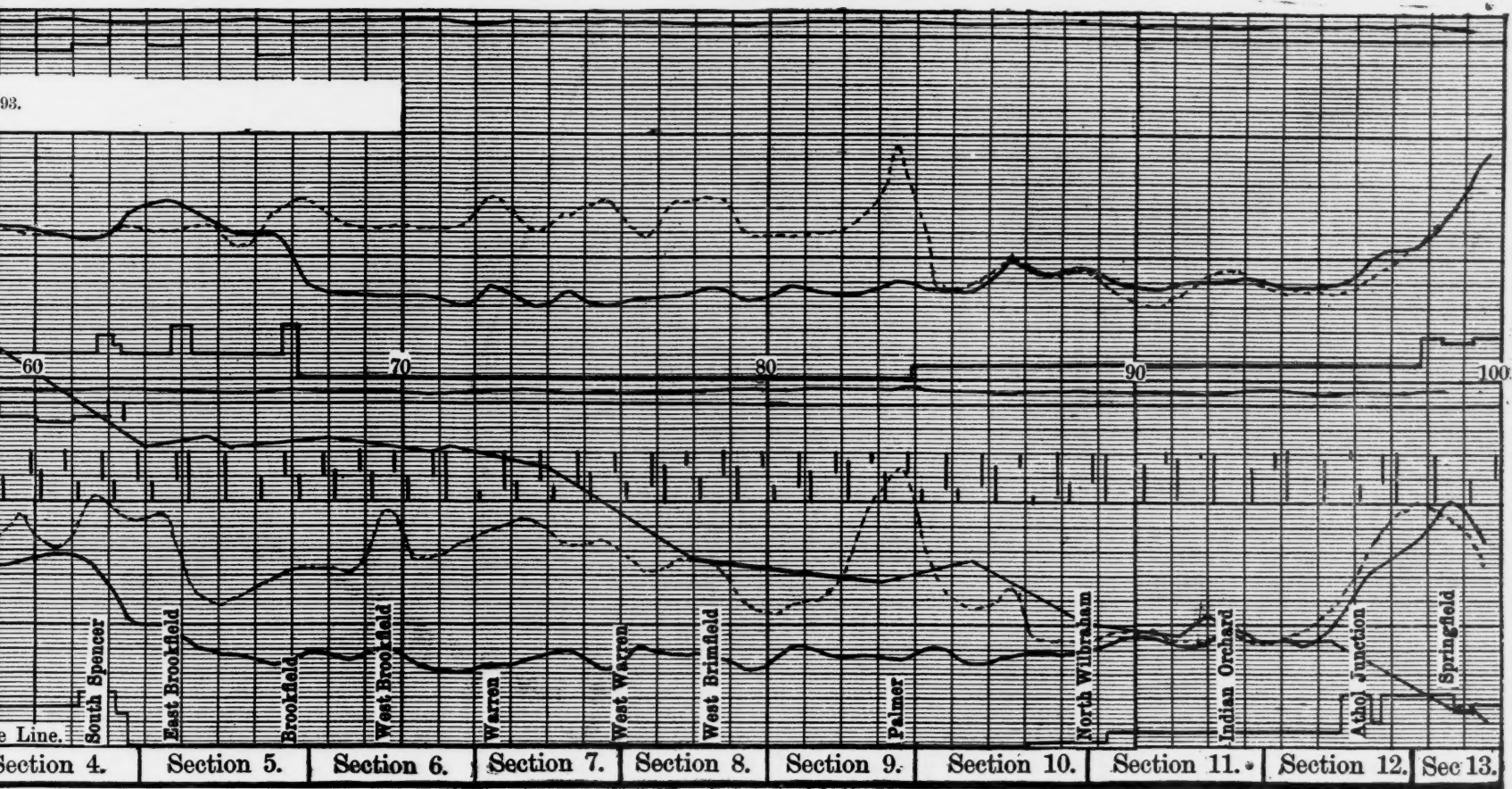


TRACK DIAGRAMS, BOSTON & ALBANY RAILROAD; TAKEN OCTOBER, 1893, AND OCTOBER, 1894.

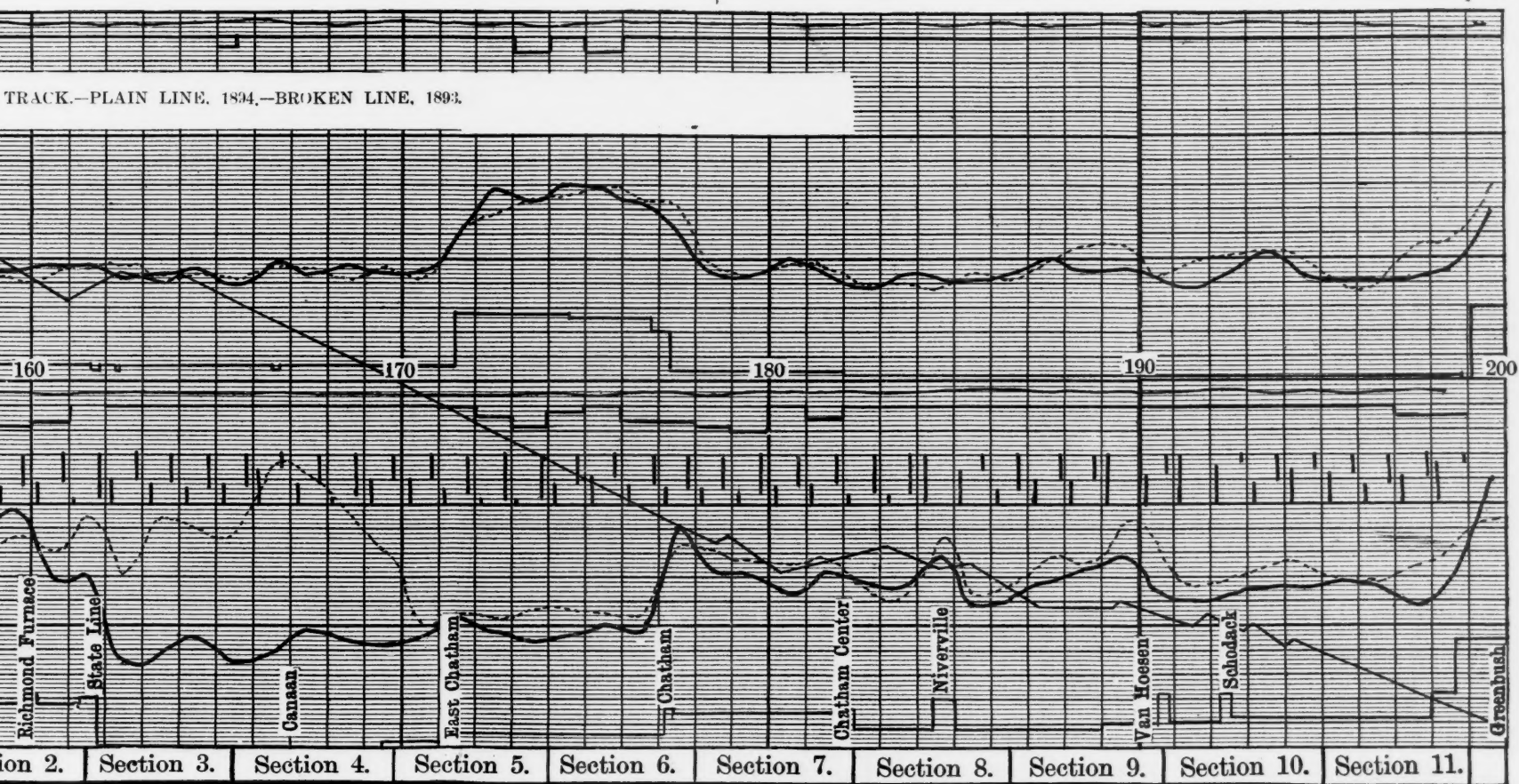
CONSULTING ENGINEER; WALTER SHEPARD, CHIEF ENGINEER; E. E. STONE, ASSISTANT ENGINEER.

Dr.





Division No. 2, Worcester to Springfield. H. E. Gage, Division Engineer; E. A. Haskell, Roadmaster.



Division No. 4, 153 Mile Post to Albany. H. E. Gage, Division Engineer; R. A. McQuaid, Roadmaster.

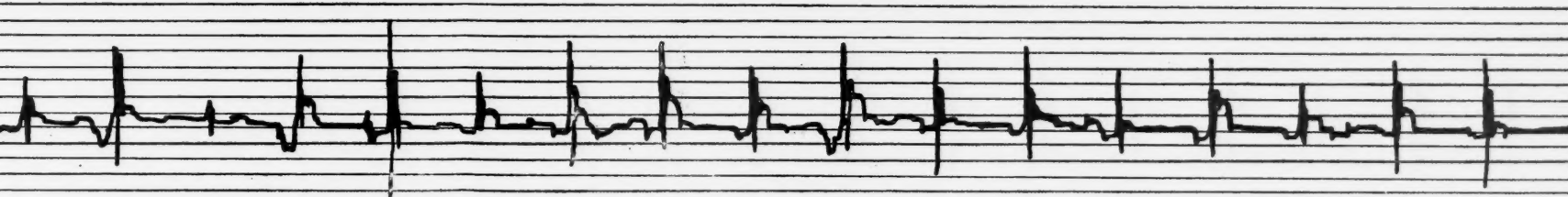
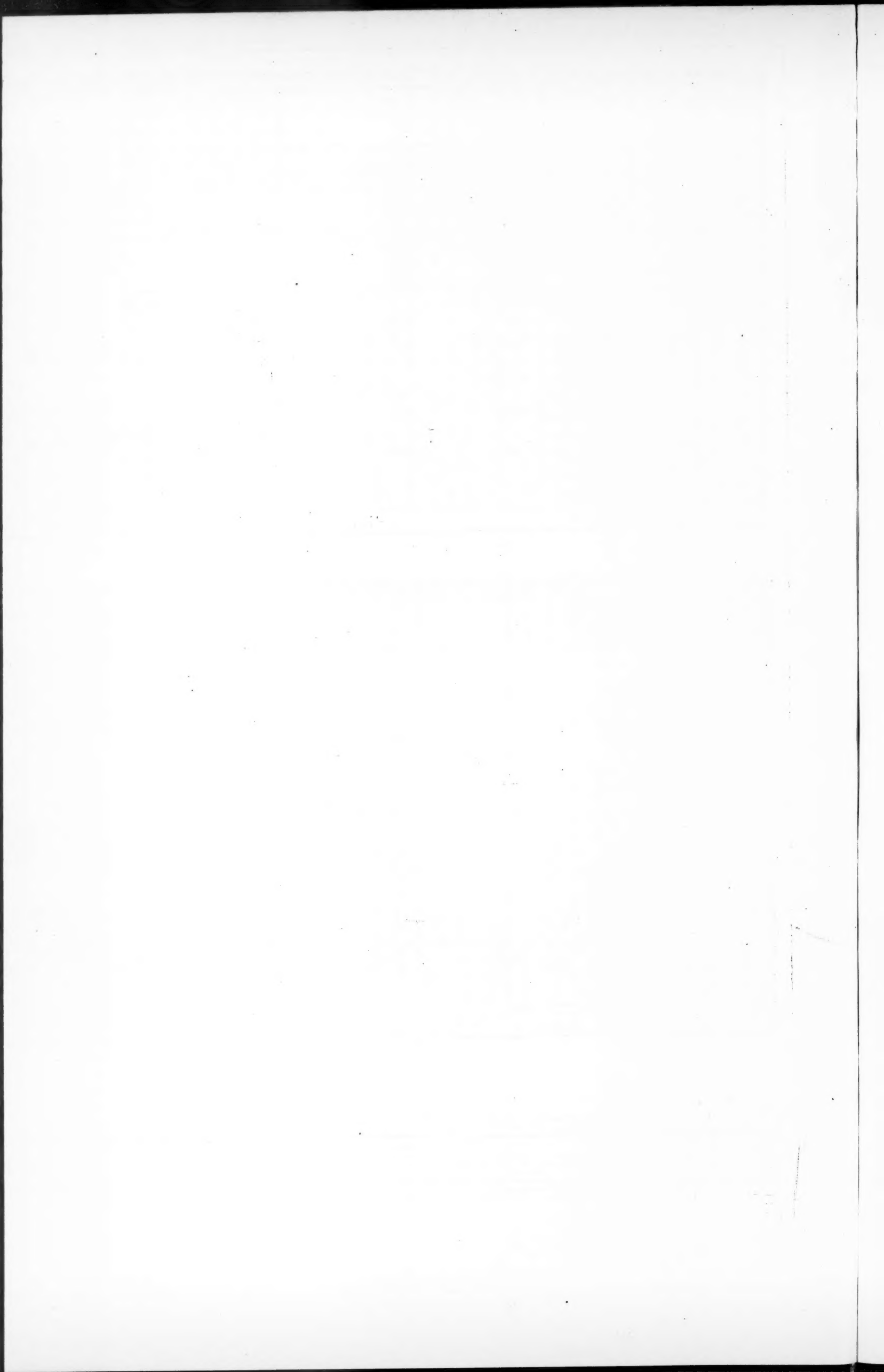


Fig. 2—Surface Undulations, 72-lb. Rails, in Service 12 Years.

ND OCTOBER, 1894.

DIAGRAMS TAKEN BY MR. P. H. DUDLEY WITH HIS DYNAGRAPH CAR.





load 3,500 tons and upward, aggregating 25,364 and averaging 3,623 tons. Nineteen sail vessels carried 2,500 tons and upward, aggregating 55,696 tons and averaging 2,931 tons, and one sail vessel carried 3,000 tons and upwards.

#### Rhode Island Locomotives for Mexico.

We have recently noted the order filled by the Rhode Island Locomotive Works for a compound locomotive for the Mexican Central and a simple engine for the Mexico Cuernavaca & Pacific. These engines are identical except that the Mexican Central engine is a four-cylinder compound from Mr. Johnstone's designs. The simple engine is somewhat lighter, weighing in working order 130,000 lbs. with 108,000 lbs. on the drivers and 22,000 on the truck. The principal dimensions and specifications are as follows:

Type	10-wheel.
Gage	4 ft. 8½ in.
Simple or compound	compound.
Kind of fuel to be used	wood.
Weight on drivers	111,000 lbs.
" truck wheels	28,000 lbs.
" total	139,000 lbs.
Wheel base, total, of engine	22 ft. 4 in.
" driving	11 ft. 0 in.
" total (engine and tender)	50 ft. 1 in.
Drivers, number	6.
" diameter	28 in.
" material of centers	cast iron.
Truck wheels, diameter	28 in.
Journals, driving axle, size	7½ × 10 in.
Driving tires	Krupp, O. H., steel, 3 in. thick.
Cylinders, diameter	15 and 30 in.
Piston, stroke	24 in.
" rod	Lowmoor iron.
Crossheads	cast steel.
Boiler	Belmaire.
" working steam pressure	180 lbs.
" material in barrel	Otis steel.
" thickness of material	shell ¾ in.; throat 1 in.
" diameter of barrel	waist at smokebox, 62½ in.
Thickness of tube sheets	¾ in.
" crown sheet	¾ in.
Crown	through bolts 1 in. diameter.
Dome, diameter	31 in.
Tubes, number	268.
" material	Franklinite, No. 13, B. W. G.
" outside diameter	2 in.
" length over sheets	13 ft. 2 in.
Firebox, length	10 ft.
" width	2 ft. 7¾ in.
" material	Otis steel.
" thickness of sheets	side and back ¾ in. crown sheet ¾ in.
" water space, width	front 4 in., sides 3¼ in., back 4 in.
Grate, kind	cast iron for wood.

These engines have the Westinghouse "X M" brake, 9½ in. pump, Nathan triple sight feed lubricator, National hollow brake beam and Fletcher compressed steel truck box lids and Nathan injectors. The springs are from A. French & Co., the driving box and connecting rod bearings of Damascus bronze. The engine truck wheels have spoke centers with Krupp open-hearth steel tires and retaining rings. The tender wheels are spoke center with Krupp steel tires held by retaining rings. The tender frame is of channel iron and the tank is of steel.

The engines have Crosby 6 in. whistles and Crosby safety valves. The cylinder head casings and steam chest casings are of pressed steel.

#### TECHNICAL.

##### Manufacturing and Business.

The entire plant of the Buffalo Brass Works at Depew, N. Y., was destroyed by fire last week.

Mr. Barclay M. Everson has been appointed sales agent of the Baldwin Locomotive Works for Pittsburgh and has established an office at the Marine Bank Building, opposite the post office, in that city.

The New York office of the Union Switch & Signal Co. is now in Room 1301, Havemeyer Building, having been removed from Room 1204, same building.

The Sterlingworth Railway Supply Co. reports that its brake-beams and steel body bolsters are now in use on the following roads: Toledo, St. Louis & Terre Haute; Burlington, Cedar Rapids & Northern; Delaware, Lackawanna & Western; Central Railroad of Georgia; Maine Central; New York, Ontario & Western; Mather Stock Car Co.; Cold Blast Transportation Co.; Fall Brook Line; Fitchburg; Georgia Southern & Florida, and the Atlanta & West Point.

Mr. Ernest S. Cronise, Consulting Engineer, with office at 37 Broad street, New York city, will hereafter represent the firm of H. K. Porter & Co., builders of light locomotives, in the East. The firm of Porter & Co., as is well known, are large manufacturers of light locomotives in every variety of size, and also manufacturers of compressed air motors. Arrangements are now being made to engage in the manufacture of electric motors, and the firm will introduce a type with valuable original features.

The Bass Wheel Works, at Lenoir City, Tenn., is engaged on an order to furnish the Louisville & Nashville Railroad with 2,000 car wheels.

A 100-H. P. gas engine is being built for the shops of the Indianapolis Switch & Frog Co., at Indianapolis.

Parsons' glass signals for showing the number of the train are being placed in the cupolas of the freight cabooses on the Wheeling & Lake Erie.

The plant of the defunct Young & Willever Block Signal Co., at Pottstown, Pa., has been sold to Stanley G. Flagg & Co., of Philadelphia. The buildings and four acres of ground were held by the contractors for debt. The purchasing company will operate a large iron works, and will commence at once to place the machinery in position.

About 4,000 men will be affected by a 10 per cent. increase in wages just announced by the officers of the National Tube Works at McKeesport, Pa.

A. & P. Roberts & Co. have announced a 10 per cent. increase in the wages of the employees in the mill, furnace, bridge and structural iron departments of the Pencoyd Iron Works, taking effect May 28 last. These works are now very busy on a number of important orders, including the Pennsylvania bridge across the Delaware at Frankford and the bridge work at New York City. The firm has also a considerable number of smaller contracts for bridge work and structural iron. It is stated that improved machinery will soon be erected at the plant.

The Norristown plant of the American Steel Castings Co., which is located at Thurlow station, just outside of Norristown, started up last week, employing about 200 men. This plant has been idle for the last year.

The Ohio Steel Co., whose plant is located at Youngstown, O., last week made a 10 per cent. advance in the wages of all its employees at Youngstown, the action affecting nearly 1,000 men.

The Watts furnaces at Middlesborough, Ky., will, according to recent statements sent out from Middlesborough, go into blast during July. This plant, it will be remembered, was built a few years ago by an English company during the prosperous days of the town of Middlesborough. The plant had just been completed when the Middlesborough boom collapsed, and has never been put in operation, the investment of over \$2,000,000 remaining idle.

#### Iron and Steel.

Operations have been resumed in full at the Riverside and Wheeling iron and steel plants, at Benwood, W. Va., the nearly 6,000 employees having accepted the 10 cents per day advance in wages.

#### New Stations and Shops.

The legislature of Tennessee has passed a bill to enable the city of Chattanooga to issue bonds to the amount of \$200,000 to any railroad company that will locate its principal shops there, and employ at least 2,000 men. Before this can be done, it must be approved by a vote of the people. It seems to have been originally intended to secure the shops of the Southern Railway, but was changed so as to apply to any railroad that can fill the requirements.

The passenger station of the Southern Railway at Charlotte, N. C., which was destroyed by fire a few days ago, will be rebuilt at once on the old site. The station of the Seaboard Air Line at the same place, which was also burned recently, will be rebuilt on the old location. The effort made by the citizens of Charlotte to get the two railroads to build a union station fell through.

The Wabash Railroad is completing foundations for a new roundhouse at Toledo to replace the one destroyed sometime ago. The structure now building will have 10 stalls, leaving space to add five more later on. A 65 ft. turn-table will be put in.

#### Elevators for Elevated Railroad Stations in Brooklyn.

The Brooklyn Elevated Railroad Co., whose lines connect the central part of the city with half a dozen large cemeteries, is to put in the necessary equipment to run funeral trains. Special cars will be provided and large elevators are to be constructed at the stations adjoining the cemeteries and at certain other stations.

#### Car Lighting in Germany.

A report on the methods of car lighting in the whole German Empire, with the exception of Bavaria, shows that from 1885 to 1894 the proportion of the cars lighted with gas rose from 60.7 to 85.4 per cent. of the whole, while the percentage lighted by oil has fallen from 27 to 10, and of candle-lighted from 12.3 to 4.6. Only one railroad uses electric lights, having equipped all its cars with accumulators. Two Prussian State railroads have experimented with them, and the Prussian Post-office Department uses them very largely in its mail cars, and, it is said, with very satisfactory results.

#### A Sea-Going Dredger.

A big dredging steamer was launched May 25 at the yards of Hugh Ramsey, Perth Amboy, N. J., for the United States Government. The vessel is being built under contract with the Bucyrus Steam Shovel & Dredge Co., of South Milwaukee, Wis., for the harbor works at Galveston, and is built from the designs of Mr. A. W. Robinson, Chief Engineer of the Bucyrus company.

The vessel is 180 ft. long, with a beam of 35½ ft., and a depth of 16 ft. She will be schooner rigged. She is equipped with two centrifugal pumps, each having a capacity of 300 cu. yds. of sand per hour, or 600 yds. for both. These deliver the sand into the internal hoppers of the vessel, which have a capacity of 600 cu. yds. The vessel is a complete ocean-going steamship, being equipped with compound propelling engines of 500 H. P., which enable her to steam at a speed of 10 knots, and her equipment includes two powerful electric search lights. The vessel has been named the "Gen. C. B. Comstock," after the distinguished officer of the Corps of Engineers recently retired. She is expected to be ready for service about July 1, when she will be sent to Galveston. Her particular service there will be in dredging the Galveston bar. The water upon it is being deepened so that the largest vessels may be able to enter the harbor, the work embracing two large jetties, each seven miles long, recently completed.

#### The Monitor Amphitrite.

This coast defense vessel was added to the commissioned fleet on April 23. She is a low freeboard monitor with two steel barbette turrets. Her keel was laid at

the Harlan & Hollingsworth yard in Wilmington, Del., in 1874, and she remained incomplete until March 3, 1887, at which time plans for her alteration and completion were made. In August, 1889, the rebuilding was begun. This vessel is smaller than the *Puritan* and is not so heavily armored. Her length on the load water line is 250 ft. 3 in., and her extreme length is 261 ft. 6 in. Her breadth is 55 ft. 10 in. and her draft 14 ft. 6 in. The total displacement is 3,990 tons. She has twin screws so placed under the stern as not to be exposed to the fire of an enemy's guns. The maximum indicated horse power is 1,600, her engines being of the inclined compound type. The coal capacity of the vessel is 250 tons, and steaming at the rate of about 9 knots she could cruise for 10 or 12 days and cover about 2,500 miles. The armor of the vessel is 9 in. thick, tapering to 6 in. below the water line. She has a protective steel deck 1¼ in. thick and is provided with a ram. The thickness of the turrets is 7½ in., while the steel barbettes surrounding the lower part of the turrets are 11½ in. thick. The turrets are operated by hydraulic machinery. The vessel carries four 10 in. breech-loading rifles and two 4 in. rapid firing guns. Besides this there is a secondary battery of two 6 pounders, two 3 pounders and two Hotchkiss revolving cannon. The vessel has no torpedo tubes.

#### Car Lighting.

The Safety Heating & Lighting Company has in its offices, in New York, an interesting exhibit arranged to show the relative illuminating values of Pintsch gas compressed, city gas compressed and city gas uncompressed, burned in various lamps used for car lighting. The exhibit shows that the rich Pintsch gas has many times the value for car lighting of the compressed city gas, which is so much depleted in illuminating power by compression.

#### Improvement of the Chicago City Railway.

The Chicago City Railway Company contemplates equipping its entire cable system with new rails, connected with the Falk joint, and already the track on State street from 39th to 63d streets has been relaid. Girder rails weighing 83 lbs. to the yard were used. North of 39th street, 70-lb. rails will be used. The process of making the Falk joints consists of surrounding the joint of the rails when laid with a mould into which molten iron is poured. This mould is so arranged that no iron is poured on the top of the head but surrounds only the web and flange.

At the same time with the renewal of the rails, the company is perfecting its system of electric lines by establishing a metallic return to the power-house. This being situated near State street, that track is chosen for the main connection with the crosstown lines, and the new rails are bonded with two pieces of 0000 copper wire.

#### Sale of the Johnson Signal Plant.

The works of the Johnson Signal Co., at Rahway, N. J., were sold by the Receiver, E. S. Savage, last week, to Mr. Oakleigh S. Thorne, President of the National Switch & Signal Co., for a cash bid of \$40,000. This sale is subject to confirmation by Chancellor McGill, of New Jersey, who, we believe, has not yet taken any action. A short time ago the Hall Signal Co. submitted a bid of \$65,000 for the works, but that bid was not accepted by the Chancellor.

#### Gas Tram-Cars in Dessau.

A line in Dessau, Germany, which has replaced its horse cars by gas motor cars, is about 2½ miles long, and opened with the new service last November. The cars are driven by a gas engine having two cylinders, connected up to the same shaft, and lying opposite each other under one side seat. These are connected with a shaft carrying a fly wheel and a gear wheel, which through an ingenious friction gearing allows the car to be stopped and started, and run at varying speeds. Gas is carried in cylindrical tanks, similar to those used for gas lighting on railroad cars. These tanks are filled at a station at the end of the line, where a pumping engine, and storage tanks holding compressed gas at eight atmospheres, are located. There are 9 cars of the smaller type used upon this line, having 12 seats and 15 standing places. There is also a 7 H. P. motor of the Deutzer system, having three tanks, carrying sufficient gas for a trip of 12 miles. The ignition is made by an electric spark, and is noiseless, and the exhaust is not apparent. The arrangement of the machinery is such that the cars present a slightly appearance, none of the machinery being visible.

#### Electric Canal Towage.

Canal barges have recently been very successfully towed by electric power on the summit level of the canal de Bourgogne. This portion of the canal is 3¼ miles long and has been made very narrow to reduce construction expenses. There is no tow path, and hauling is effected on the submerged chain principal. The hauling upon the chain is now done by electric power instead of by steam, as heretofore. A generating house has been fixed at each end of the section, the current being generated by water power. The dynamos at the two stations, 3¼ miles apart, are coupled in series. The three mains are suspended on rubber insulators in part from wires spanning the canal and in part from the tunnel roof of the tunnel sections of the canal. Trolley arms of the usual type are used. The motor used on the tug which hauls upon the submerged chain is of 19 H. P., running at 900 revolutions per minute. During the passage through the tunnel the current is utilized to light the boat, and at night is used for this purpose during the entire run. The cost of the plant was about \$27,000, and a saving of \$800 a year is recorded.





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#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Supreme Court of the United States approves of the action of Judge Woods in putting Debs and his associates in jail for contempt of court, and the main points of the decision, delivered by Justice Brewer, are given in another column. But the point on which Judge Woods' action has been most questioned by conservative critics, that it too summarily denies the right of trial by jury, is not at all cleared up by this decision, for the Supreme Court does not for a moment question the rightfulness of the use of the injunction in this case, and it holds that the finding of fact by the Circuit Court is not open to review on habeas corpus, in the Supreme or any other court. Judicial minded men, not at all in sympathy with "labor" demagogues, or with any of the prevailing nonsense of the day, hold that the remedy at law was adequate to the emergency, the only claim to the contrary—the allegation that it was slow—having been met by the prompt action of President Cleveland in sending troops to the scene of the trouble. This being so, the use of the injunction was unnecessary, and it served to confirm the popular view prevalent in some parts of the West, that the courts are the tools of the rich. This line of criticism was well expressed by the New York *Evening Post* in an article reprinted by us September 14, page 637. The distrust of this method of punishment—on evidence that had been weighed by one man only, even though he was a judge—was heightened by the fact that Judge Woods' statement of the facts, in his decision (*Railroad Gazette*, Dec. 21, page 864), did not set forth very clear proof that the defendants had actually done the things forbidden in the injunction. But, as we have said, this matter is not now decided, and the demand that judges shall use the injunction more sparingly will have to remain in abeyance until the question comes up in more pointed form. The great fact remains that the highest judicial tribunal has swept away a great amount of sophistry about the alleged usurpations of the Federal Government, and has defined the powers of the President and the Federal Courts, in the protection of interstate commerce, in "ringing" words. Debs is yet liable to punishment, by a court and jury, on a criminal charge, and his trial before Judge Grosscup, at Chicago, is already set for the July term. There is no doubt that he is morally guilty, and his course since his arrest indicates that he will be proved technically guilty also.

About a year ago we began to disseminate information and to try to stimulate interest in the International Railroad Congress through information printed in the columns of the *Railroad Gazette* and by correspondence. It is gratifying to know that the railroads of the United States are to be so well represented, as appears from the list published by us last week. To be sure the number of railroads directly represented is small, only ten out of all our vast system; but the American Railway Association will speak for a great mileage, and the delegates from the Association and from the individual roads are worthy of the occasion, and will represent us well. It is unfortunate, however, that a great many more railroad officers have

not appreciated the situation, realized the pleasure and benefit to be derived from the Congress, the trifling expense of membership and the ease with which delegates could attend. Those who do go, however, will have something to remember for a good while. The programme, arranged by the railroad companies, appears on another page. This, attractive as it is, represents very inadequately, we are sure, the hospitality which the Englishmen are prepared to show to all of the delegates, and especially to those from this side of the Atlantic. In its technical features the Congress will be important; as a vacation it will be delightful; but we venture to believe that so far as the delegates from the United States are concerned, its most useful influence will be in destroying in the minds of some of them the germs of that shallow way of looking at men and things outside of our own borders, which may, perhaps, be conveniently summed up in the word "jingoism."

#### The Railroads, the City and the Suburbs.

A topic of perpetual interest to social philosophers is that of the crowding of the people into the great cities. Hardly a month passes that one may not see in one or the other of those numerous magazines and reviews which serve so well to keep the most sluggish modern man in the current of human interest, an article on the miserable results of over-crowding of the cities or on the means taken to relieve congested regions. Some of the most striking figures that we have seen are in an article by Mr. Riis in the *March Forum*. His proposition is that "the tenement is the real problem of civilization," and taking New York as the typical American city he proceeds to show some of the conditions there. He finds that New York below the Harlem River has the densest population of any city in the world, namely, 144.2 inhabitants per acre; Paris has 125.2 and Berlin 113.6. The Tenth ward in New York City has a population of 626.26 to the acre, and in the Eleventh ward there is one sanitary district in which, on 32 acres, is crowded a population of 986.4 per acre. These, it must be remembered, are the people who live in this area, not those who come and go for temporary purposes. The densest section of Europe is believed to be the Josefstadt of Prague which has only 485.4 inhabitants per acre. Furthermore, it is said that over half the population of New York lives in tenements, and while the death rate at large is not heavy, the death rate where a rear tenement is built on a city lot rises to about three times the rate for the city as a whole. But death is only one of the evils of the overcrowding; among the others we may reckon the destruction of the intelligence, the morality and the productive capacity of the people.

New York, as we say, is taken by Mr. Riis as the typical city. Other writers have often shown the growth of cities at the expense of the country, the growth of big towns at the expense of little ones, and frequently deplore the constant rush, of the young men particularly, into the cities.

And what have the railroads to do with all this? Mr. Riis speaks of the universal drift toward cities that characterizes this age of steam. It is hardly worth while to stop now to inquire how far the age of steam is responsible for the concentration of population, but, surely, men tended to huddle into cities for protection and for the convenience of trade and for a hundred other reasons for many centuries before the steam engine was ever thought of, unless we assume with the eloquent G. P. A. of the New York Central, that the prophet Isaiah predicted the wonders of that great four-track road. In fact whatever steam may have had to do with the concentration of population it will soon have a great deal to do with its dissipation.

Indeed, there are several influences working which will act to relieve the crowded centers of population and to make life more healthy, more enjoyable, more moral and more intellectual for the great masses of humanity who are now crowded into the cities. All improvements in methods of transportation tend to lighten the burdens of humanity, but there are some quite recent improvements that are acting specially to help the dwellers in the cities. The introduction of electricity as a motive power and of the bicycle are very important events, sure to have a profound effect on the future of humanity. There is a convenient term which writers on naval matters have introduced into common language, and which the young strategists and diplomats of the daily newspaper offices have taken up with avidity, "the radius of action;" and the two influences of which we have just spoken, the trolley and the bicycle, have much increased the radius of action of the city man. They will increase it far more in the future; and this is a fact which the managers of the steam railroads will have to take account of. The bicycle, the trolley and the steam railroad will all have their share in scattering the populations of the cities.

We need not try now to forecast the parts to be played in the life of the next century by these various agencies. But it is easy to see that within a radius of 8 or 10 miles a great many active and comparatively prosperous people will go back and forth on their wheels. Within a zone of about 15 miles, possibly up to 20, the trolley will carry a good many suburban people. For greater distances the suburbs can still be served better by the steam railroad. The outcome of the working of these agencies, either together or in competition, will doubtless be a dissipation, into suburban districts of an important percentage of the populations still huddled in the cities. Those who most need to be scattered, the very poorest, cannot take advantage, directly, of these agencies; but thinning out the stratum next above, would, we should suppose, relieve the tension on the lowest stratum.

While the railroads which enter the great cities of the United States have been pretty enterprising and liberal in developing suburban business there is one direction in which it has long seemed to us that they might do more to their own ultimate profit and to the great good of the communities that they serve. Their suburban services do not seem to be contrived to draw out into country homes the classes which earn very low wages. They have done little in the way of workmen's trains, at early hours, at very low rates. In this particular they could learn something from English practice, and we recommend to those gentlemen who have the good fortune to go to the International Congress to make a special study of the London workmen's trains.

The London County Council has done a good deal within the last few years to better the condition of the working people, and of the very poor people who must live in and about London; and among other things this body has been persistent in its efforts to increase the train service available for men coming into London for their day's work. We have before us a document showing the conditions which existed early in 1892, which is the most complete investigation that we have seen. An examination was made, by a committee of the Council, of the train service furnished by various railroads. We will take first those entering London from the south.

The London & South Western runs early morning workmen's trains which serve stations 19 miles out from Waterloo. Cheap tickets are issued, permitting workmen to go into London by these trains and to return by any train having third-class carriages after 12 o'clock on Saturdays, and 2 o'clock on other days. The special trains available for these tickets, between the hours of 4:35 and 7:58 in the morning, are 13 up and 14 down; but the total number of daily trains available for workmen's tickets, going and coming, is 149 on other days than Saturday and 265 on Saturdays. The approximate number of persons daily using workmen's tickets by trains entering Waterloo is between 5,000 and 6,000. The mean rate per mile for the workmen's tickets within the Metropolitan area is about .91 cent; for places outside the Metropolitan area it is about .62 cent. There is a good deal of complaint of this rate as being high, and perhaps it is. At any rate, workmen traveling only five miles have to pay about eight cents for the round trip.

On the South Eastern there are four trains up in the morning, only one of which, however, starts from outside of the Metropolitan area. This gives a measure of the train service in the morning. But workmen's tickets are available on third-class carriages out in the afternoon. There are altogether 187 trains a day which may be thus used. The cost per mile runs from .42 cent to 1.11 cents.

The London, Chatham & Dover runs workmen's trains in from stations 7½ miles from Ludgate Hill; that is, all are within the Metropolitan area. There are 13 special workmen's trains up every morning. The usual arrangements are made for returning, making available 191 trains a day. The average cost per mile is about .8 of a cent.

The London, Brighton & South Coast serves 37 stations by workmen's trains, the most distant being 11½ miles from London Bridge. The special early trains up (in) are 14, and seven down (out), in addition to which are 15 trains run between local stations, making 86 trains a day expressly provided for the working men. Adding to these all of the trains available for returns there are about 400 daily trains which may be used. Some very low rates are found, one as low as .31 cent per mile and four below .40. The average is lower than on any of the other lines south of London, being .64 cent.

Coming to the other side of the Thames we find on the London, Tilbury & South End, five stations, four being outside the Metropolitan area, the most distant eight miles from Fenchurch street, served by special workmen's trains. Cheap third-class return tickets are issued to and from a good many other stations. There are five early morning trains in all. The rate per mile



is .55 cent. The cheap third-class return rate is one cent a mile.

The Great Northern gives a good service for workmen. Twenty-two stations are served, 20 being outside the Metropolitan area and the most distant 10½ miles from King's Cross. There are nine workmen's trains up, and the cheap third-class (one single third-class fare for the double journey) may be used by any outgoing train, the time for the arrival of which at the station for which the ticket is granted is not later than 8 a. m. There are 17 trains up and 11 down for the special accommodation of workmen, and these tickets are available altogether on 328 trains—that is, counting as heretofore the trains which may be used in the afternoon for the return. The special rate for the workmen's tickets is .66 cent. The cheap third-class return ticket averages about one cent a mile.

The Great Eastern is especially the workmen's London railroad, the one which, to quote the language of the committee of the Council, "above all others appears to welcome him as a desirable customer, whose requirements are made the subject of special study and provision, to an extent and in a variety of ways, that no other London line seems to do. The system is so extensive, varied and complex that it is difficult to condense the particulars."

There are 36 stations between which and the London termini special workmen's trains are run, the most distant being 10½ miles from Liverpool street. There is a workmen's ticket available only on the special early trains and for return only after 12 o'clock Saturdays and 4 o'clock other days. This is issued at specially low rates. Then there is a somewhat dearer kind of ticket called the cheap third-class return for working men, available on any train due to reach the London terminus before 8 a. m., and for return by almost any train carrying third-class carriages. The total special workmen's trains up daily are 36, but considering all of the other classes of trains in which workmen's tickets are more or less available the total amounts to about 400. The average rate per mile for the cheapest class of ticket is .64 cent. There are stations at which the rate per mile comes down to as low as .19 cent.

On the Metropolitan District Railroad there are 59 stations between which workmen's trains are run, 15 of these being outside the Metropolitan area, and the most distant 16½ miles from Whitechapel. There are no less than 27 early trains, 14 up and 13 down, between 5:19 and 8:40 in the morning. The service is exceptionally good and carefully arranged to meet the requirements of the laboring classes over a very large area.

The Midland issues workmen's tickets from 13 stations; 5 are outside the Metropolitan area, the most distant being 8 miles. There is only one special workmen's train leaving the most distant station at 4:55 in the morning. The accommodation for workmen therefore is not very good. The rate per mile averages .65 cent and for the most distant station it comes down to .036 cent.

The North London provides 21 early trains up between 5:16 and 8:01. The average rate per mile is .59 cent. For the most distant station the rate is .31 cent.

The London & Northwestern is said by the committee to furnish a poor and complicated service for the workmen. There appear to be only five stations between which any London workmen's tickets are available, the most distant being Williden Junction, 10 miles out. There are five trains up and 36 in all available, up and down, including the afternoon return. The average rate per mile is .60 cent, which is exceptionally low, and the company gives a very low third-class return.

Nearly eight years ago we made a careful study of the kinds of tickets provided, and the rates for suburban service about five principal American cities. The highest and lowest rates per mile that we found were as below:

	5 miles.	10 miles.	20 miles.
Highest (cents).....	1.92	1.16	1.00
Lowest (cent).....	0.83	0.83	0.57

The London rates, as gleaned from the document in hand, are, about:

	5 miles.	8 miles.	10 miles.	14 miles.
Highest (cent).....	0.90	0.46	0.50	0.42
Lowest (cent).....	0.40	0.16	0.20	0.31

There is another important difference in practice: The low London rates can be had generally on daily tickets. To get them it is never necessary to buy a ticket for a longer time than a week. Here, on the contrary, one must buy a monthly ticket at least to get the lowest rate, and in many cases a quarterly ticket. Indeed, eight years ago, there were roads on which one had to buy tickets for 12 consecutive months to get the minimum rate, and perhaps some roads still maintain this condition. It is obvious that the privilege of buying from day to day, or by the week, is a very important one to the man working for very low wages, and a vital one if employment is irregular.

#### The Convention of Railroad Commissioners.

The most conspicuous result of the recent convention of state railroad commissioners at Washington was to again emphasize the fact that most of the commissioners are in the position of round pegs in square holes. The condition of things at present existing in many states has been well set forth by the North Dakota commissioners in two annual reports (although it is not in all cases the result, as it is there, of constitutional limitations). They say:

The Commission is firmly of the opinion that the most satisfactory and best results of the Board of Commissioners can never be attained until there is a stability and permanency given to the Board it does not now possess and cannot be conferred upon it under our present constitution. There is no other branch of the executive part of a state government that requires such an amount of practical experience and knowledge as that of commissioners of railroads. As long as the Board is liable to a complete change every two years the state cannot expect the best results. In one term of office of two years, not even an elementary knowledge can be attained of the principles which govern, or ought to govern, the regulation and management of railroads. To expect men taken from the mass of the people, without any previous special preparation to accomplish the best results in dealing with men who have made the subject a life study, is to expect almost an impossibility.

We cannot too earnestly recommend that the constitution be so amended that the board will always be composed of at least one experienced commissioner. We believe the terms should be made six years, and one commissioner be elected every two years. As the term of office of all of the present board expires this year they cannot be accused of having any interest in this recommendation other than that of private citizens. . . . Unless the change is effected the state can never have a thoroughly efficient board, for by the time one board has acquired a sufficient knowledge of the duties of the office and the technical information of railroad matters to make them useful to the state, they are displaced by another board who have to cover the same period of incompetency, giving the state always an uninformed board, when by the change it would always have a competent and well informed board.

And where legal or supposed business reasons do not exist, petty political or personal influences come in, so that one can assert almost with certainty that no dozen or score of American state railroad commissioners will ever contain more than a very small percentage of strong minds well equipped for their work. In most states the legislatures take a narrow or childish view of the matter and consequently fix the salaries at a low figure; this alone is enough to keep capable men out of the commissionerships (or to make good men leave them after a very short term); and so it comes about that a national convention, though made up of estimable gentlemen, advances the science of state control so very little, that the advance is inappreciable.

In some states the situation seems to have been realized, for the commissioners stayed away from the meeting, evidently feeling that the taxpayers' money by which they are supported ought not to be spent for a mere pleasure excursion, however profitable it might be as a pleasure excursion.

The defect we have named is a vital one. The most favorable view that can be taken of a railroad commissioners' convention is that, even if the commissioners are inexperienced or otherwise unqualified, it is profitable for them to get together and listen to instructive addresses by men who are qualified to teach them; but this argument fails, for two reasons; the subjects of such addresses are not generally of a kind needing eloquence or personal magnetism to impress the hearer, so that a paper circulated by mail answers the purposes as well as an oral address; and, secondly, the usual secondary object of gathering to hear an address, that of discussing it afterward, is proved by experience not to exist in this case. The discussions at Washington were of the most desultory character. The address of Commissioner Knapp, which is not given out, but which is reported to have been excellent, elicited not a word of comment. The inability of these gentlemen to start a profitable discussion is not wholly due to their inexperience, of course; many of the questions are puzzling to those experienced in dealing with them, so that the wisest assemblage would be dumb—or ought to be. But this is only an added reason for declaring that the convention is a useless luxury and that the commissioners' time would be better spent in other occupations.

Some of the subjects discussed at Washington were matters of clerical detail hardly requiring argument, except the argument with the treasury whether the proposed reform was worth what it would cost; and in the principal matter of this kind the committee decided before hand to *not* *pros* their case because their proposal involved an expenditure that was out of the question. About the same considerations would apply to the proposal to record train mileage by states in order to be able to apportion operating expenses on that basis. It would be a good thing to thus divide railroad statistics by state lines, for purposes of taxation, if thereby the use of rational theories of taxation could be promoted, but in view of the continued tendency in most of the states to tax railroads by

whatever method, rational or irrational, promises the greatest relief to the other taxpayers, the assessment question cuts but a small figure in the traffic auditor's office.

Mr. Woodruff's paper on electric railroads was the most practical utterance before the convention, but the only action taken upon it was to refer the subject to a committee where it will almost of necessity sleep undisturbed for a year. Uniform classification appeared in a slightly more hopeful aspect than heretofore, but we cannot see that the essential problems of which it is composed have been changed in any appreciable degree. Railroad men who, all along, had wished that these problems might be made solvable have simply expressed the same wish a little louder. Demurrage, and overcharge, and other subjects were merely touched upon in the most informal manner.

The North Dakota commissioners are about right; the office of railroad commissioner requires much knowledge and experience; and these are difficult to get, and costly. Men will accept governorships and other offices for the honor, without adequate salaries, and in many such positions a good equipment of common sense will take the place of technical knowledge. But a railroad commissionership has no glamour about it, and a man fit to fill it generally wants a fair salary. Railroad management is too intricate and railroad managers are too much like their own steam engines to be treated by the state as a mere incident as related to the administration. A two-thousand dollar commissioner is not likely to deal successfully with a twenty-thousand-dollar railroad manager.

And finally, if North Dakota or any other state concludes to take the good advice of these commissioners, and give a better tenure of office, there is so much that can be learned by reading elementary books in one's own library, and it is such a big problem to put in practice the things thus learned, that were it not for the fact that going to Washington is a pleasant journey and one has a chance to call upon President Cleveland, we should think that there would be more absentees next year than there were this.

#### American and English Railroads.

Last February Mr. Jeremiah Head, M. Inst. C. E., read before the Cleveland Institution of Engineers, England, a paper on "American Rail and Tramways," which is of interest to Americans because of the candid discussion and comparison of our methods with those of England which it contains. Mr. Head, accompanied by his son, Mr. A. P. Head, also an engineer, whose assistance in the preparation of the paper is acknowledged, has made two long journeys through the United States, and is therefore well equipped for a judicious comparison of things which are to be seen upon the surface.

Comparing the cost of railroads per mile in the two countries he states the ratio at 1 to 0.267 per mile open, and per mile of single track at 1 to 0.33, and the average return on capital so employed is as 1 to 0.91; unity referring to roads in the United Kingdom. He estimates that 25 per cent. of American railroads, and 55 per cent. of those in the United Kingdom have double tracks; even his British audience being surprised to know that there is so large a proportion of single track road in the United Kingdom, probably because Ireland, Scotland and Wales do not form essential parts of the United Kingdom to a true-born Englishman, until he has given the subject a second thought.

We are surprised, in turn, to notice as the first of the directions in which Mr. Head congratulates the English upon keeping ahead of American practice, that they operate their railroads *more cheaply* than the Americans do, requiring only 56.6 per cent. of the gross earnings, whereas the Americans require 70.4 per cent. of their earnings. This is a statement which might be expected only from a promoter or from a broker; it is quickly set right when Mr. Head comes to speak of the charges per ton per mile, showing that, in part owing to the carriage of less dead weight and in part to the longer haul which we have, we are able to carry with a profit, in exceptional cases, at ⅓ of a penny per ton mile. Mr. Head says the average English rate is "about one penny," yet we are told by experts that that is a matter "which no feller can find out;" for there are no statistics.

Mr. Head approves our sleeping, dining and palace cars, which in the matters of easy traveling, freedom from draughts, efficient lighting and warming, luxurious feeding and sleeping arrangements are, he says, decidedly ahead of those in England.

There are two kinds of British travelers, as we are compelled, in conscience, to mention here; those who, like Mr. Head, abhor draughts, and others who, like Mr. Potter, find a fresh breeze from the open window of the coach delightful, provided the sash can be let down, protecting the person below the nostrils, instead of being raised, as with us, exposing all the person except them; and this is a disagreement not to be reconciled except by providing separate compartments, so that each may have his choice.

Mr. Head admires the American "boggy rolling stock," especially because it is adapted to less perfect roads than are insisted upon in England, where the need



of cheaper lines into the as yet unprovided parts of the country is being felt. It might have been a shock to our National vanity, however, to read that the bogie "was fitted by Robert Stephenson & Co. to one of the earlier locomotives made and sent by them to America, that it might the more easily run round quick curves and on bad roads. Its value was at once seen and appreciated there." Until the Columbian Exposition we supposed the swivelling truck was certainly originated in the Mohawk Valley; but there was exhibited a perfect four-wheeled truck, swivelling under the bolster which carried the load, said to be identical with those which had been used in Hungary since the twelfth century. Since then we do not care for the claims of Jervis, nor of Stevenson "our withers are unwrung."

All of Mr. Head's remarks as an engineer, his criticisms and his approvals are valuable. He thinks the tension and compression springs connected with our car-couplings far too weak; he advocates our flat-bottomed rail instead of the English bullhead, and the long angle-bar joint, extending across three ties, in preference to the suspended fish-bar joint. Many other Americanisms commend themselves to him, but his criticisms are of more value to our readers. We therefore copy, in conclusion, his summary as to Where English Railways Excel.

"Among the directions in which we may congratulate ourselves on still keeping ahead of American practice the following are the most conspicuous, viz.:

"1st. We operate our railways more cheaply than they do, we requiring 56.6 per cent. and they 70.4 per cent. of the gross earnings for that purpose.

"2d. The net earnings of our railways are over four times as much per mile of line, and over three times as much per mile of single track as those of the States.

"3d. The average return on capital employed is in our case from 20 to 28 per cent. more than in theirs, notwithstanding our far more profuse expenditure in construction and operation.

"4th. Users of our railways have the option of three times as many trains as have the Americans.

"5th. Trains in England travel at a much higher speed on the average than they do in the States or in any other country.

"6th. The railway passenger here runs less risk of accident than there in the proportion of 1 to about 4.5, notwithstanding the higher speed at which he travels, and he is conveyed, if he is content with ordinary accommodation, at a lower rate per mile.

"7th. He has almost everywhere better station accommodation, and better facilities for getting himself and his baggage from stations to his destination."

A new passenger tariff is to go into effect in Austria July 1. The first zone tariff, adopted about 1891, was found too low, and it is hoped to increase earnings with the new one. The fares will be (in Austrian currency) kreuzers per kilometer:

	Class 3	Class 2	Class 1
1 to 100 kilometers.....	1.4	2.4	3.4
101 to 300 ".....	1.2	2.2	3.2
301 to 600 ".....	1.0	2.0	3.0
Over 600 ".....	0.8	1.8	2.8

It will be seen that the rates for the two higher classes are in all cases just 1 kreuzer per kilometer higher than for the class next lower. The kreuzer, now that Austria is on the gold standard, is a trifle less than half a cent, and 1 kreuzer per kilometer = 0.773 cent per mile. So for the shortest distances (62 miles or less) the fares will be 1.082, 1.855 and 2.628 cents per mile, and for the longest—that is, for that part of a journey in excess of 373 miles—they will be 0.618, 1.391 and 2.164 cents, respectively. To compare with our fares, we compute the fares by the new Austrian tariff for some frequented routes in this country:

	Class 3	Class 2	Class 1
New York to Philadelphia, 90 m.....	\$0.93	\$1.63	\$2.32
New York to Albany, 142 m.....	1.39	2.49	3.59
Chicago to St. Louis, 280 m.....	2.55	4.71	6.87
New York to Buffalo, 440 m.....	3.68	7.08	10.49
New York to Chicago, 960 m.....	6.89	14.31	21.73

This is not a "zone" tariff in the usual sense, there being an addition to the fare for every 10 kilometers traveled. These fares are those for the ordinary passenger trains, which are slow. For the express trains, which are not very fast, an addition of  $\frac{1}{2}$ , 1 and  $1\frac{1}{2}$  kreuzers per kilometer is made for the three classes, severally, equal to 0.386, 0.773 and 1.159 cents per mile, respectively. No through trains on the above-named American routes run as slowly as the Austrian ordinary passenger trains, and most of them are faster than the Austrian express trains. The addition for speed would make the New York-Chicago rates by the Austrian tariff \$10.60, \$21.73 and \$32.86 for the three classes, respectively.

The legislature of Illinois has just rejected a bill proposing to punish train robbers more severely, on the ground that railroads and their servants, the trainmen, already oppress an inoffensive public more than the public can endure. This action was taken in spite of strong arguments presented by the friends of the bill, re-enforced by an account of a savage attack upon a Chicago & Alton train, in which the engineman was killed, that happened not far from the capital of the state only a night or two before the discussion took place. The prevailing argument was embellished with a blood-curdling word picture showing how the innocent passenger who might, as a last resort, lift his feeble arm in self defense, after being knocked down and trampled upon by a brakeman, would be brought before a court and summarily sentenced to be hung, on the verdict of a jury of his peers, which jury, we must assume, would be composed wholly of the minions of the railroad company. But down in Mexico, where they are somewhat more experienced in dealing with train robbers, and where they do not believe in giving the robber the benefit of the

doubt quite so freely, questions of this kind are decided somewhat differently. A dispatch from the City of Mexico of May 19 states that Congress has passed a law to regulate the manner of dealing with train robbers as follows:

"If, during the assault of any train, there should result a case of robbery or the death of one or more passengers, the criminal, if apprehended, will then be condemned to suffer the death penalty, without any other formality than the drafting of the minutes regarding the execution by the officers in charge of the forces effecting his capture. Those whose capture shall not be made at the moment of the commission of their crimes, will be tried by the authorities most adjacent to the spot of their apprehension, in the peremptory period of 15 days, and be made to suffer the death penalty."

The reduction of the speed of the electric street cars in Brooklyn, ordered by the city government, has been so thoroughly carried out by the companies that passengers are going back to the elevated railroads; and they have already gone back in such numbers that the Elevated has raised wages. In doing this the company evidently believes that the public ought to be made acquainted with the fact that there is a field for "public sympathy" among elevated as well as among surface railroad employees, and the circular issued to the employees by General Manager I. D. Barton is made public. It says:

"Beginning June 1 the wages of employees [practically all in the operating and mechanical departments except enginemen and clerks] will be restored to the rates that prevailed prior to Oct. 1, 1893 [making an increase of about 10 per cent.]. The officers of the company believe that no danger exists that your wages will again be reduced, because the earnings of the company are assured to permit of fair wages so long as the surface of the streets of Brooklyn is not used for rapid-transit purposes; and it is because of the cessation of rapid transit on the surface of the streets that the company has been able to fulfill its promise that whenever a surplus above fixed charges and operating expenses shall have been earned, wages would be restored. I take this opportunity of again expressing my appreciation to you all for the excellent services you have rendered the company during the winter and since."

About 700 men will be affected. The rates which are not raised had not been reduced. The men on the electric cars (who have been at work there only since the February strike) say that the falling off in patronage has led the company to put on so many "trippers"—cars which run only a few trips each day and on which, therefore, the men earn very low wages—that the regular conductors and motormen suffer great losses.

The new Water Purveyor of the city of New York (whose duties are to purvey pavements and not water) has made an important recommendation as to new pavements. It is that the city should spend next year \$780,100 for 195,025 sq. yds. of asphalt pavement. It is proposed further that this new pavement shall be in the poor and densely populated parts of the city. Moreover, it is proposed that it shall be laid with some continuity of line so that asphalted thoroughfares may be made. Heretofore a great part of the asphalt laid has been in lengths of a block or two, as a matter of comfort to a few people, and not as a part of an intelligent system. In Mr. North's project "the principle has been to continue the very necessary work, in a sanitary point of view, of asphaltting the streets in the overcrowded districts east of the Bowery, to which is added the populous regions about the Five Points. In addition to this streets have been selected for asphalt pavement that will extend the present lines of transportation and open routes across the city which will cheapen the delivery of goods and give comfortable access to some of the more important ferries." In fact, 84.7 per cent. of the new work will be where most needed for sanitary purposes, in the lower part of the city. The underlying principle in selecting the streets for asphaltting has been that the people who most need healthful streets are the very ones who have least power and capacity to advance their own interests, viz., the very poor.

The well-known but not very familiar fact that one can travel on a railroad, even when wide awake and in his right mind, without knowing whether he is going forward or backward was again illustrated near Lynbrook, L. I., one night last week, where a hand car was run into an open draw and a man was drowned. The accident happened on the Long Beach Branch of the Long Island Railroad, during the night, when the draw-bridge is usually left open for the passage of boats. The three men approached the bridge carefully, in the darkness, fixed the draw for their car to pass and propelled it over, stopping on the farther side. They then opened the draw, got aboard the car and worked the levers as usual, but they moved the car backward instead of forward and, it being dark, they did not notice that they were going in the wrong direction; a moment later the car and its three occupants fell into the bay and only two of them succeeded in getting out. A collision which happened in England, from a cause similar to this, was reported in the *Railroad Gazette* a few years ago. An engine and caboose which had been stopped in a tunnel ran backward some distance without the movement being noticed by either the enginemen or the trainmen, and, the grade out of the tunnel being descending, acquired sufficient speed to run at considerable violence into another train.

Very full statistics of the movement of freight by water in Russia are collected and published by the government. The rivers of Russia are important, and canal connections are made which supplement them. The

grain and flour movement by water has decreased rapidly, having been in tons:

1890.	1890.	1891.	1892.
2,725,200	2,495,800	2,194,200	1,558,800

In 1889 the quantity was equal to the weight of 90,000,000 bushels of wheat, and nearly five-eighths of it was carried on the Volga, which is navigable for nearly 2,000 miles, and has one tributary branch, the Kama, navigable for more than 1,100 miles. It is on this stream where the chief falling-off in the shipments has taken place, and it is said that the navigation of the stream is becoming more difficult than formerly, but there is a decrease on nearly all the streams. In 1892, of the total water shipments, exclusive of wood and timber (which make up five-eighths of the whole), more than one-third was petroleum and its products, and very little more was grain and flour. Next comes salt, while of coal only 90,000 tons were carried by water.

The Seaboard Air Line has now attacked the "boycott" at another point. The suit reported a few weeks ago was based on the specific rights which it was believed the Air Line possessed by reason of a special contract under which the Nashville, Chattanooga & St. Louis operates the Western & Atlantic Railroad; but the claim now put forth is that anything in the nature of a boycott of one railroad by another is illegal and an application has been presented to Judge Speer, of the United States Court at Atlanta, asking to have every road in the Southern Railway & Steamship Association restrained from withholding through ticket and billing facilities from the Seaboard Air Line. Judge Speer has granted a temporary restraining order. It appears that the suit against the Nashville, Chattanooga & St. Louis is not before the United States Court but the Georgia Supreme Court.

It is a peculiarity of Russian railroads that their stations are generally two miles, or more, distant from the towns and villages which they serve. This is said to be on account of the danger of fire, the houses in small places generally being thatched with straw. But this does not apply to the cities, whose stations also are usually remote, and the Russian locomotive spark must be remarkably tenacious of life if it can fly two miles, a mile, or even half a mile, and still set fire to a dry thatch. Just now a movement is on foot to establish stations near the business centers of the chief places on all new lines.

#### NEW PUBLICATIONS.

*Practical Telegraphy.* By F. E. Wessels, West Ridley Park, Pa.

This is a little pamphlet of 24 pages, for which the author asks 50 cents. He is an instructor in shorthand, typewriting and telegraphy, and evidently understands his subject thoroughly, but we are not sure that there is a very large field for his book. Most of the information given in it is available elsewhere practically for nothing. The chapters on train orders and block signaling are too brief to be of much value. The last chapter is on the use of the typewriter for receiving messages, with samples of Phillips' code of abbreviations, by which it is easy to transmit 2,500 words an hour with the Morse apparatus. Experts can send 70 words a minute by using this code.

#### TRADE CATALOGUES.

*Metal Sawing Machinery.*—The Q. & C. Co., Western Union Building, Chicago, sends us a catalogue of its cold metal sawing machines. These include shop saws and the Bryant metal sawing machines, both portable and power. These portable machines are now very largely used by steam railroads and street railroads for rail sawing and are furnished in two sizes, one with a 16-in. blade for ordinary rails and one with a 20 $\frac{1}{2}$ -in. blade for 9-in. street rails.

*Paint.*—The National Paint Works, Williamsport, Pa., has issued a pamphlet calling attention to their wares. This company makes Elliot's asphaltum paints which are very widely used by railroad companies, and others for cars, bridged, buildings and other structures. The company claims that more cars and railroad buildings are painted with its paints than by any other paint made by any one firm in the United States. The pamphlet gives testimonials and references to users.

*Standard Scales, etc.* The Fairbanks Co., New York, etc., 1894.

This large volume, 9 $\frac{1}{2}$  in. x 12 $\frac{1}{2}$  in., contains over 500 pages, devoted to descriptions of scales for all purposes, valves, steam fittings, engines, boilers, pumps, planers, lathes, slotters and machinery of all kinds, wire rope, shafting bells, jacks, locks, trucks, coal and other cars, rock crushers, etc., etc. Several pages are devoted to tables of useful information. The index is complete.

*The Hinson Car Coupler.*—Under date of April 1, the Hinson Manufacturing Co., The Rookery, Chicago, issues a catalogue of Hinson couplers. These, as is well-known, are M. C. B. couplers. One type is made with a bottom lock and another with a top lock. The catalogue shows couplers for freight cars, passenger cars and tenders.

*The Mottier Safety Signal Co.,* of Cleveland, whose three-position semaphore signal was recently illustrated in the *Railroad Gazette*, has issued a neat pamphlet, in a white cover embellished with blue and gold, describing its signal. There is a numbered list of parts, with illustrations, for convenience in ordering.



## THE SCRAP HEAP.

## Notes.

The New York, Lake Erie & Western has ordered the workmen in all its shops to work 10 hours a day. This is the first general resumption of full time in these shops for more than two years.

The station of the Mount Washington Railroad at the foot of Mount Washington, N. H., was burned on May 23, together with three locomotives, car house, shops, etc. The loss is \$30,000. Four engines and three cars were saved.

The strike of miners in the Pittsburgh district was given up last week, the leaders having held out for about 12 weeks. The strikers wanted 69 cents a ton and the operators offered 60 cents. Many of the men, after seeing their places filled, rushed back to try to get employment.

The local freight agents of the Pennsylvania Railroad in New York and vicinity have been on an excursion to Baltimore and other places as the guests of the company. A similar excursion of division and other freight agents of the Pennsylvania Lines West of Pittsburgh has been visiting New York and Philadelphia, inspecting the terminal and other facilities of the company.

The Mayor of New York City has officially approved the law recently passed by the legislature of the state requiring elevated railroads to run trains at least as late as midnight and at intervals of not more than 12 minutes between 8 p. m. and midnight. The bill was designed to compel the running of night trains on the Ninth Avenue line of the Manhattan Elevated, where the last train now runs about 8 p. m.

The Railroad Commissioners of Oregon have won their suit for a mandamus commanding the Secretary of State to pay them their salaries. It had been claimed that the law establishing the Commission was unconstitutional, or that if it were not so the failure of the last legislature to elect new commissioners created a vacancy; and, finally, that even if a vacancy were not thus produced the commissioners had forfeited their right to their respective offices by not each filing a new oath of office. Judge Hewitt rejects all these arguments.

The special session of the Missouri Legislature, which was convened a few weeks ago for only two purposes, one of which was to pass a bill defining fellow servants, has adjourned without result. A bill was passed by the Lower House, giving the friends of the movement such a bill as they wanted, adding largely to the liability of corporations for injuries to employees, but it failed in the Senate. According to the press dispatches "the railroad lobby was so powerful that there was never at any time any likelihood that the bill would pass the Senate."

An inspector of passenger train service has been appointed for the Pennsylvania Railroad Division of the Pennsylvania Railroad and the first appointee is Mr. G. R. Cadwalader, who will be connected with the office of the General Superintendent. It will be his duty to look after such matters as affect the comfort and convenience of passengers, that they may have the benefit of all service and facilities provided, whether in cars furnished by the railroad company or by the Pullman Company. The matter of lighting, ventilation and the conduct of train employees will be especially looked after.

## Damages for Not Furnishing Cars.

In the Common Pleas Court at Athens, O., May 1, the suit of the Buckeye Coal Co. against the Columbus, Hocking Valley & Toledo Railroad, for damages sustained by inequitable distribution of coal cars, was decided by a referee in favor of the coal company. The suit was for \$30,000, and was based on the claim that in the winter of 1892-93, when coal business was active and there was a demand for all the coal that all the mines on this road could furnish, the arbitrary rule of the road for the distribution of empty coal cars worked to the injury of the Buckeye's business. The referee awarded \$3,387 damages, which is the amount of profit he estimates the plaintiffs have lost. They demanded reimbursement not only for this, but also for a large number of contracts lost and for losses in suits for damages for failure to fulfill contracts; besides this, the mines being shut down part of the time, workmen left their places and went elsewhere. But the referee held that these damages were too indefinite for him to recognize. The plaintiffs, who are independent operators, claimed that the discrimination was in favor of lessees of the railroad company's mines.

## Riot Damages at Chicago.

Fifteen damage suits against the city of Chicago were instituted in the Circuit Court last week to recover for damage to property during the railroad strike last summer, in favor of the following parties:

Pitts., C. & St. L. Ry.	\$750,000
Iowa Central R. R.	750
Armour & Co.	5,000
Robt. Law.	150
Jones & Laughlin	4,500
Coke Bros. & Co.	3,500
Deering Harvester Co.	5,000
Garden City Post and Printing Co.	250
Arms Palace Horse Car Co.	1,000
W. P. Read & Co.	1,500
Laurel Hill Car and Coal Co.	3,500
New Pittsburgh Coal Co.	300
Bell-Lea Coal Co.	150
Nelson Morris & Co.	1,500

## Dominion Railroad Subsidies.

A newspaper summary gives the amount of money which was paid out in railroad subsidies by the Dominion Government since the beginning of the fiscal year as \$1,152,296. Among the amounts so paid are the following: Ottawa, Arnprior & Parry Sound, \$248,180; Lake Temiscamingue Colonization, \$233,200; Drummond County, \$92,096; Canada Eastern, \$30,400; Phillipsburgh Junction, \$2,912; Grand Trunk (Owen Sound branch), \$39,744; Pontiac Pacific Junction, \$18,750; United Counties, \$41,075; Great Northern, \$32,000; Quebec, Montmorancy & Charlevoix, \$30,400; Dominion Coal Co., \$32,000.

## Fast Train from London to Liverpool.

Press dispatches of May 15 announce that an express train is to be put on between London and Liverpool, over the London & Northwestern, to make the trip in 3 hours 50 minutes, making no stops and making close connection with Transatlantic steamers. The distance is 201 miles, which makes the rate of speed 52.43 miles an hour. The schedule is 45 minutes quicker than that of any other train between the two cities.

## Pig Iron.

The last issue of the *Iron Age* gives its usual monthly report of pig iron in production. It appears that the weekly capacity of furnaces in blast on May 1, in gross tons, was 156,554. This is the lowest point reached since Oct. 1, 1894, when it was 151,135. The capacity was higher on Nov. 1, and still higher on Dec. 1, when it reached the maximum, namely, 168,763 tons. From that time it has declined gradually to the present figure. But the capacity on May 1 was greater than at any other date since June 1, 1893, when it was 174,029 tons. From that time it fell, the lowest point having been June 1, 1894, namely, 63,517 tons.

## Iron and Steel Statistics.

The annual statistical report of the American Iron & Steel Association, prepared by Mr. James N. Swank, General Manager, has been published within the month. This is a very valuable compilation, giving statistics of the iron ore, coal, pig iron and steel industries of the United States and of foreign countries, not only for the current year, but going back in many particulars for various periods, in some instances as far back as 1843. Indeed, the pig iron statistics are carried back as far as 1740. The report is published in a pamphlet of 38 pages and is sold for \$3 and may be procured of Mr. Swank at 261 South Fourth street, Philadelphia, Pa. We tabulate below a few figures:

	1894.	1893.
Iron ore produced, United States, gross tons.....	11,880,000	11,588,000
Imports of iron ore, gross tons.....	167,307	526,951
Coke from Connellsville, net tons.....	5,454,000	5,044,797
Average price of coke.....	\$1.00	\$1.50
Pocahontas coke, net tons.....	865,684	514,722
Anthracite from Pennsylvania mines, gross tons.....	41,391,000	43,090,000
Production of pig iron, gross tons.....	6,657,588	7,124,502
Bessemer ingots, gross tons.....	3,571,313	3,215,686
Open hearth ingots and direct castings, gross tons.....	784,936	737,890
Rails, gross tons.....	1,021,772	1,136,458
Exports of iron and steel.....	\$29,943,729	\$30,159,363
Iron and steel vessels built, gross tons.....	51,470	94,532
Average price No. 1 anthracite pig, Philadelphia.....	\$12.66	\$14.52
Gray Forge pig, Philadelphia.....	10.73	12.73
Bessemer pig, Pittsburgh.....	11.58	12.57
Steel rails at mills, Pennsylvania.....	24.10	28.12
Steel billets at mills, Pittsburgh.....	16.58	20.44

## A Circus Train.

The Memphis Car & Foundry Works' is building a circus train of six cars, which, when completed, will make a train as long as two ordinary trains of the same number of cars. There are one elephant car and five flat cars in the course of construction. They are nearly twice as long as the ordinary car. The elephant is said not to be savage, but of an inquiring mind. He wants to know what is going on without, and he frequently thrusts his trunk through and rips open the side of a car and views the landscape at his will until the keeper can have him more securely closed in. The builders flatter themselves that Jumbo's kin will not let himself out of this car. It is 8 ft. clear on the inside, and is 50 ft. long. Its sides are of double thickness. The outer wall is of cypress and the inner of smoothly dressed oak. There is not a bolt head nor a bar that he can get hold of to twist out with his trunk. The windows are covered with wrought iron bars.—*Memphis Commercial Appeal*.

## New Ships for the British Navy.

Six war vessels now building for the royal navy in the dockyards are reaching the launching stage. These are the twin-screw second-class cruiser Talbot, and the twin-screw sloop Phoenix, under construction at Devonport; the first class battleship Victorious, and the second class cruiser Minerva, under construction at Chatham; the first-class battleship Prince George, under construction at Portsmouth; and the first-class battleship Renown, under construction at Pembroke. The two first named will, it is reported, be launched almost immediately. The officials at Chatham Dockyard expect to have the Victorious, which was laid down last May, ready to leave the building slip in July next, while the Minerva could be sufficiently advanced to be floated a month earlier than that. At Portsmouth, the Prince George will be rather later, but the Chatham battleship had a start of three months in being laid down. At Pembroke, it is expected the first-class battleship Renown, which was commenced on Feb. 1, 1893, will be launched early this month.

## Mexican Railroads.

The message of President Diaz to the Mexican Congress contains the following reference to the railroad lines of the country: The principal lines having been constructed up to the limits of their concessions, those which are now building, under recent concessions, are advancing slowly on account of the difficulties caused by the high rate of foreign exchange; this reason also explains why the lines now in operation are giving preference to maintaining and improving their roadbeds and rolling stock, and limit their foreign orders to the materials strictly necessary to attain such objects. Notwithstanding this, it is worthy of special mention, that the companies are showing a growing spirit of enterprise in extending branches into many agricultural regions hitherto unexploited. The railroads of the Federal District have been extended to Naucalpan and to the suburb of San Rafael, and the route to Mexicaltzingo has been double-tracked.

The line from Izucar to Acapulco will soon be opened for traffic as far as Tlaxiucaplan. The International has done considerable work on its line from Reata to Monterey. The road from Monclova to the Pacific has now over 470 kilometers of its survey approved by the Department. The company building from Merida to Campeche is continuing its work of grading; the plans for the connection with the line from Merida to Progreso have also been approved. This latter line will facilitate the export trade of the Peninsula to a great degree.

A company, under concession from the State of Nuevo Leon, has constructed a road in Monterey, the Monterey Mineral and Belt Railway, to facilitate the exploitation of several mines. The Nautla Railroad has continued construction from Huisslapan to Teziutlan. The grading on the Mexican, Cuernavaca & Pacific has been forwarded somewhat, and its branch to Coajomulco will soon be finished.

On the Tehuantepec Railway, owned by the Government, special and constant attention has been paid to

the improvement of the roadbed, repairing the bridges, and generally putting the line in good order for permanent working. The Jaltepec bridge has been reconstructed and the rolling stock equipment has been increased and will be still further augmented when the extra cars now ordered shall have been delivered. The traffic increased on the opening of the entire line to four times its amount previous to that time.

## Grade Crossings in Pennsylvania.

The Baltimore & Ohio Railroad has secured the right of grade crossing over Second avenue, in the Twenty third Ward. This will be one of the most dangerous grade crossings in the city, and two electric cars will pass the crossing every five minutes. The attempt to have the courts intervene and prohibit this grade crossing failed, the judges deciding there was no law authorizing their intervention. So this dangerous crossing is to be made under the sanction of law, as interpreted by our local courts, while the Supreme Court has only recently issued a sweeping edict against railroads crossing each other's lines at grade in the country districts.

This decision applied to the extension of the Beech Creek Railroad and its crossing branch coal roads of the Pennsylvania Railroad in Clearfield County. The Beech Creek road attempted to cross these branch roads at grade. The local courts sustained them in the right under certain restrictions, but on appeal to the Supreme Court the lower court was reversed and crossings at grade prohibited. The Beech Creek road was put to an expense in elevating its crossings of considerably over \$100,000 by this decision of the Supreme Court. The lateral roads are little used, two or three coal trains passing over some of them in a day. It is curious that the Supreme Court was prompt in prohibiting grade crossings up in the woods of Clearfield County, while the local courts sanction grade crossings over one of the greatest thoroughfares in the city of Pittsburgh. Of course there must be reasons plentiful why a city thoroughfare should be without protection, while an isolated mountain road is made sacred. They are buried in a mountain of judicial wisdom.—*Pittsburgh Post*.

## The Duties of a Passenger Agent.

Passenger agents often talk too much. One of the most frequent manifestations of the disposition to multiply words unnecessarily is the passenger agent's description of himself. Like all of the rest of us, he must make himself out a hero; and, like the rest of us, he sometimes finds it necessary to use a good deal of rhetoric in order to carry his point in this respect. The glorifications of each other which passenger agents indulge in at their semi-annual conventions often leave one with the feeling that the glorifiers have not fully made out their case. This is largely due to the fact that they try to make out too much of a case; for, so far as a description in words is concerned, the passenger agent's business is quite simple. As authority for this we quote Mr. Fred Roblin, a Passenger Agent of the Plant System, who, according to a Boston paper, has recently described the duties of his office in what seems to us a model statement. Mr. Roblin says:

The Traveling Passenger Agent has an office, but he is seldom in it. He must have the faculty of being in at least three or four widely separated places at the same time. The sleeping-car is his normal dormitory, the railway restaurant is his dining-room. The Traveling Passenger Agent of the Plant system is credited with covering more miles every year than any of his associates. His lines extend from Jamaica, in the West Indies, to Halifax, in Nova Scotia, and he no sooner reaches Halifax than he is urgently needed in Jamaica. Early in the summer I smooth the way Northward for the Southerners who have done well with their cotton and watermelons, and then go up to Halifax to convince the Nova Scotians that the only way to reach Boston and New York is by the Plant Line boats. I visit all the cities within a thousand miles to see that our tickets are on sale and to introduce them where they are lacking. You could trace my way by the shower of posters and circulars I leave behind me. One of my chief duties is to make the acquaintance of ticket agents of other lines. I should like to know all the ticket agents in the country if I could—not merely to shake hands with them and speak about the weather, but to impress myself upon them so that they would remember me. I like to have a man know me so well that when a customer asks him about routes to any of the points on our lines he thinks immediately about Roblin, and that suggests my lines to him. . . . I want to know the ticket agents, because I want them to sell our tickets.

## The Train Robber and the Tactician.

The reader may remember (he is assumed to remember some things that the editor forgets) that Lieutenant Knight, U. S. A., lately proposed in the *North American Review* a plan for circumventing train robbers. It was in brief that repeating shot-guns should be provided in passenger cars, and that the express car should be put at the rear of the train. Thus the attack would be divided and the defense would be between the detached wings of the attacking force—a situation which would have pleased Napoleon. Concerning this, "Jerry Sullivan," a trackman, writes in the *Roadmaster*: "The shotgun equipment would suit the passengers to a 'T.' They could kill chipmunks, prairie dogs and jack rabbits to their hearts' content. The leading Western train robbers are also delighted with the idea. Instead of catching the track-walker and making him flag the train, and everybody run a chance of being shot, all that will be necessary is for one of their number to purchase a ticket, and when at the agreed place step out and disconnect the express car, set the hand brake, and then all will be smooth sailing for them. Of course they understand there would be bloody riot if the conductor attempted to back the passengers into a nest of armed robbers, nor could the company afford to take chances of lawsuits for damages from such cases. It is a great scheme, and some of the leading highwaymen promise to send the lieutenant a percentage of the first haul made under his new plan."

## The Fish Traffic in England.

Some interesting figures are given in a recent issue of *Transport* (London) concerning the great fish-carrying business by rail in the United Kingdom. This is a very important part of the freight traffic of that country, as is seen from the following figures, taken from the above-mentioned article.

The total quantity of fish landed upon the shores of England and Wales during 1894, exclusive of shellfish, amounted to 351,000 tons, valued at about \$24,910,000, which is increased to \$26,455,000 by the addition of the value of the shellfish. For Scotland 308,600 tons were landed, valued, including shellfish, at \$8,175,000. The corresponding figures for Ireland are 42,500 tons and \$1,370,000. The entire United Kingdom shows about 702,000 tons, valued, at place of landing, and including shellfish, at about \$36,000,000. This industry gives employment to 124,187 men and boys, of whom 80,466 are in constant employment.



The fish is carried by rail principally from the ports of Grimsby, Hull, Yarmouth, Lowestoft, Scarborough, Milford and Tyne-mouth. In 1894, 232,601 tons were carried from these ports. During 1894 the quantity of fish carried by the railroads throughout the kingdom was: England and Wales, 332,449 tons; Scotland, 99,763 tons; Ireland, 10,399 tons, making a total for the entire kingdom of 442,611 tons. A great part of this business is done by trains run at passenger train speeds.

#### A Monument for the Victims of Ashtabula.

A monument has been erected in Chestnut Grove Cemetery, Ashtabula, O., as a memorial of the unidentified persons who perished in the railroad disaster at that place on Dec. 29, 1876. It is a granite shaft 32 ft. high and was erected by the subscriptions of prominent citizens of Ohio and others under the lead of Mr. T. W. McCreary, of Ashtabula. The speakers at the dedication on May 30 were Mr. Harry Garfield and Mr. J. H. Hoyt.

#### The Lucania's Quick Passage.

The Cunard line steamship Lucania arrived at Queens-town at 6:55 on the morning of May 24, having covered the 2,897 miles between that port and New York in five days 11 hours and 49 minutes, thus establishing a new record for that route.

#### Trial Trip of the St. Louis.

The steamship St. Louis of the American Line, recently completed at the Cramp shipyard at Philadelphia, left there on May 25 for a trial trip at sea. This will probably last three days. Only representatives of the International Navigation Co. and of the Cramps were on board.

#### Railroad Passes for M. P.'s in Canada.

A press dispatch says: The question of granting railroad passes to members of Parliament received a thorough thrashing out in the House of Commons yesterday. For the last 22 years the regular mileage indemnity has been paid to members of the Senate and House of Commons at the rate of 10 cents a mile for the distance each way between their homes and Ottawa, computed by the shortest mail route. Notwithstanding this, it is a notorious fact that nine-tenths, if not all of the members travel on passes, though never neglecting to draw their mileage, and it is against this practice that a bill has been introduced. From the tone of the discussion it seems to be the general impression that hereafter passes to members will be legalized, but that no mileage rate will be allowed them.

#### The Storage Battery in Germany.

The German town of Hagen, in Westphalia, has in operation a storage battery street railroad, on the Waddell-Entz system, which has been running for the past five months. The line was opened Jan. 10 by the Hagen Street Railroad Company, and the electric service extends over about two miles of the system. No changes have been made in the track. Each of the cars, with its batteries and full load of 26 passengers, weighs about 7 tons. The current is used for heating and lighting the cars as well as propelling them. There are two battery boxes in every car, and each contains 44 elements, weighing altogether 1,350 kilos, or about 300 lbs. Each car is equipped with a 15-H. P. motor. Several cars of similar pattern are now in experimental use on one of the street car lines of Vienna. The cost of the service at Hagen, it is said, has thus far compared very favorably with the cost of horse traction.

#### LOCOMOTIVE BUILDING.

The Missouri Pacific last week gave out an order for ten eight-wheel passenger locomotives to the Baldwin Locomotive Works.

The Chilean Government recently sent out bids for locomotives for the state railroads in that country. These engines will probably all be built in the United States, and it is stated that the Rogers Locomotive Works has secured the contract for a portion of the engines. The government will probably order 14 locomotives altogether.

#### CAR BUILDING.

The Toledo, St. Louis & Kansas City is reported to have issued specifications for several hundred freight cars. The number is not yet decided upon, but it will probably be between 300 and 500.

The South Baltimore Car Works have an order for 200 coal cars to be built for the West Fairmount Coal & Coke Co. and to be operated chiefly on the lines of the Baltimore & Ohio Railroad.

The shops of the Wheeling & Lake Erie, at Toledo, O., have just finished a combination mail and baggage car, the fixtures of the mail compartment being made precisely according to the specifications of the government.

The Ryan-McDonald Manufacturing Co., is building at its works at Baltimore, 30 ore cars for the Catskill V. triified Brick Co. All these cars will be equipped with the vacuum brake of the American Brake Co.

The notice of the award of the freight cars for the Texas & Pacific printed last week was premature. The company is still receiving bids on 300 box cars. It is not definitely decided that this number of cars will be ordered, and when the contract is given out, it may be for a larger number. The bids received for this equipment have been forwarded to the New York office of the company.

Four new combination cars have just been completed at the East Fitchburg shops of the Fitchburg Railroad: two are combination baggage and smoking cars for suburban service; the third car is a combination mail and smoker, and the fourth combination baggage and day coach.

The award of the Choctaw, Oklahoma & Gulf Railroad freight cars, which has been talked of for some time, is now likely to be given out within a few days at the company's office, 420 Walnut street, Philadelphia. The order will be for 500 cars, divided between cattle and box cars.

#### BRIDGE BUILDING.

All-gheny, Pa.—The Pittsburgh Bridge Co. has been awarded the contract for the Allegheny County bridges, consisting of eight spans, through plate girders. The spans will be one each of 30, 33, 34, 38, 43, 47 and two 80 feet long.

Cohoes, N. Y.—The Cohoes City Railway Co. has awarded the contract for a new steel bridge to span the Erie canal at Columbia street to the Boston Bridge Co. The bridge will be paid for by the railroad company and will be built after plans which have been approved by the Superintendent of Public Works and State Engineer.

Corinth, N. Y.—The town of Corinth has authority to bond itself for one-third of \$14,600 for the erection of a new iron free highway bridge over the Hudson River, connecting the towns of Corinth and Luzerne, the rest of the money being county funds.

Montreal, Que.—The Canadian Bridge Co. has secured the contract for the bridge work on the Atlantic & Lake Superior Railway on the section unfinished between Chaudiere Junction and Yamaska. The bridges include one over the St. Francis between St. Francois du Lac and Pierreville of 1,900 ft. in length, with an average span of 120 ft., and a height above the river bottom of 60 ft.; a deck bridge at Nicolet over the Nicolet River, 600 ft. in length and 120 ft. span, with facilities for vehicular traffic; and also one at Becancour which measures with approaches some 1,300 ft. Besides these there are several of less importance, of which the principal are those across the Gentilly River, River du Chene and the Chaudiere River.

Sioux City, Ia.—The stock of the Credit's Commutation Co., of Sioux City, Ia., which controls the property of the Pacific Short Line bridge, a partially built structure across the Missouri River between Sioux City and Covington, is to be assessed at 10 per cent. to provide funds for the completion of the bridge. The capital stock of the company is \$4,000,000. In addition to the amount secured from the assessment the company will have a bonus of \$320,000 from Sioux City to complete its bridge, and as favorable arrangements have been made for the contractors for the structure in regard to payment for their work it is expected that the work of completing the bridge will now be advanced rapidly.

#### RAILROAD LAW—NOTES OF DECISIONS.

##### Powers, Liabilities and Regulation of Railroads.

In a case in the Federal Court a railroad, whose sole property was the equipment and leasehold of another road, passed into the hands of a receiver. The annual rent was a first lien on the equipment, and the leasehold was subject to forfeiture for nonpayment of the rent. Owing to general business depression, the earnings of the road fell off until they were not sufficient to pay the rent, and the receiver ordered a reduction of 10 per cent. in the wages of all employees. It appeared that a like reduction had been theretofore made by competing roads and that, in order to avoid discharging many employees the receiver had been compelled to lessen the working time of each one. The Court holds that the reduction was not unreasonable.

The Supreme Court of Illinois rules that, in the absence of an ordinance limiting the speed of railroad trains through a village, a railroad company may run its trains through such village at any rate of speed consistent with the safety of its trains and passengers and of persons rightfully upon its right of way at road crossings, who are exercising ordinary care.

In the Federal Court it is ruled that where a railroad goes into the hands of a receiver without funds, and the earnings under the receivership are only enough to pay current operating expenses, arrears of salary of the President will not be paid in preference to a first mortgage debt out of the proceeds of the road.

In California it is held by the Supreme Court that when a railroad, empowered by charter to build its road between termini in different counties, lays its tracks at one terminus on a wharf, and the whole railroad is assessed by the state board of equalization, pursuant to the constitutional provision, that the roadbed, rails and rolling stock of all railroads operated in more than one county shall be assessed by that board, an assessment of the wharf by the county tax collector does not constitute double taxation, since the wharf is not a necessary part of the railroad and brings in a separate income.

A South Carolina statute provides that, on the consummation of the act of consolidation by several railroad companies, the rights and franchises of each shall be deemed vested in the new corporation without any further act of deed. The Federal Court rules that where each of the corporations, at the date of the consolidation, had outstanding bonds, secured by mortgages, the directors of the new corporation could, without the vote of the stockholders, issue a mortgage on the property of the new corporation to substitute new bonds for the bonds of the old corporations.

In Colorado it is held that the legislature may authorize a city to compel a railway company which has laid its tracks across a street, to bridge its tracks at its own expense when public necessity requires it.

In Pennsylvania it is said that compensation paid for the use of equipment by railroads, at a certain percentage of its value, is not interest on borrowed capital, but is part of the operating expenses, and must be deducted from the gross receipts, to ascertain the net earnings for purposes of taxation.

The Supreme Court of Texas holds that in the absence of statute, a sale and conveyance of railroad property in the hands of a receiver transfers it to the purchaser free from all claims against the receiver.

##### Injuries to Passengers, Employees and Strangers.

The Supreme Court of South Carolina rules that where a conductor knows that a passenger, by reason of her physical condition, needs assistance in alighting, it is negligence not to furnish it.

In Texas it is held that one claiming that he was injured while riding on a freight train as a passenger must show that the company allowed such trains to carry passengers, and he must take notice of the fact that a train made up exclusively of freight cars is not for passengers.

In Massachusetts, each month during plaintiff's intestate's employment he would receive from the defendant, free, a 62-ride ticket over its line, good between the place of his employment and his home, and he was riding on such a ticket when he was killed. It contained more rides than he needed for traveling to and from his work, and he could use them at any time for his own convenience. The Supreme Court rules that he was a passenger.

In Texas, a boy 12 years of age boarded a freight train by permission of a brakeman, to whom he paid 15 cents for a five-mile ride. The train was composed of an engine, flat car and caboose, and the boy rode upon a flat car. It was not shown that the company allowed that train to carry passengers. The Supreme Court holds that the boy was not a passenger.

The Supreme Court of Appeals of Maryland holds that a train dispatcher, employed by the Division Superintendent, though he has power to employ and discharge brakemen and flagmen and has general charge of the movement of trains, is a fellow servant of an engineer, who is also subject to the instructions of the Division Superintendent.

In Missouri where the death of an engineer is caused by a collision of his engine with a bull that had come on the track through a defect in the fence, the defective fence is the proximate cause of the injury, though the train was going at a greater rate of speed than that allowed by the rules of the company.

In Indiana a railroad is liable for the death of an employee, caused by the absence from a train, for the purpose of getting something to eat, of part of a train crew, who were required to remain on duty 19 hours without any way of getting meals, though decedent was a fellow-servant.

In Georgia where a city ordinance limits the speed of locomotives within the city to five miles an hour, it is negligence, per se, as to employees whose duty requires them to cross or be on the tracks, to violate the ordinance by running at a higher speed.

In the Federal Court it is ruled that for a railroad to receive from a connecting line and transport cars with double buffers, or deadwoods, in good condition, is not negligence making it liable to a brakeman for injury received in coupling, they being in use on other well-managed roads.

In Washington where the persons operating a railroad train have no reason to suspect the presence of a boy 10 years old, who is trespassing on the right of way, he can get no benefit from the fact of his tender years, and the company is not liable for injuries to him, in the absence of such gross negligence as amounts to wantonness.

In Michigan, plaintiff and her husband, who approached the crossing in a cutter, testified that they were listening, the horse having been brought to a walk; that it was a calm day, and that they heard no signals. A person on the train testified positively that signals were not given. This is held sufficient evidence to go to the jury.

In the Federal Court it is held that the designation of a railroad crossing by a sign is sufficient under the Tennessee statute to render a railroad liable for an accident at such crossing, where the engineer failed to blow the whistle or ring the bell, though the sign was 50 ft. from the crossing, was not lettered on the side towards the railroad, and some of the letters had become obliterated.

- <sup>1</sup> Thomas v. C., N. O. & T. P. Ry. Co., 62 Fed. Rep. 17.
- <sup>2</sup> Partlow v. I. C., 37 N. E. Rep. 663.
- <sup>3</sup> Nat. Bank v. C., K. & W., 63 Fed. Rep. 25.
- <sup>4</sup> Pacific Coast Ry. v. Ramage, 37 Pac. Rep., 532.
- <sup>5</sup> Phinizy v. A. & K., 62 Fed. Rep., 678.
- <sup>6</sup> People v. U. P., 37 Pac. Rep., 610.
- <sup>7</sup> Com. v. P. & E., 30 Atl. Rep., 145.
- <sup>8</sup> Howe v. St. Clair, 27 S. W. Rep., 800.
- <sup>9</sup> Madden v. P. R. & W. C., 19 S. E. Rep., 951.
- <sup>10</sup> T. & P. v. Black, 27 S. W. Rep., 118.
- <sup>11</sup> Doyle v. Fitchburg, 37 N. E. Rep., 770.
- <sup>12</sup> T. & P. v. Black, 27 S. W. Rep., 118.
- <sup>13</sup> N. & W. v. Hoover, 29 Atl. Rep., 991.
- <sup>14</sup> Dickson v. O. & St. L., 27 S. W. Rep., 476.
- <sup>15</sup> Penn. Co. v. McCaffery, 28 N. E. Rep., 67.
- <sup>16</sup> Central R. & B. Co. v. Brantley, 20 S. E. Rep., 98.
- <sup>17</sup> North. Pac. v. Blake, 63 Fed. Rep., 45.
- <sup>18</sup> Matson v. P. T. S., 37 Pac. Rep., 705.
- <sup>19</sup> Mc Ollough v. M. St. P. & S. S. M., 59 N. W. Rep., 618.
- <sup>20</sup> W. & A. v. Roberson, 61 Fed. Rep., 592.

#### MEETINGS AND ANNOUNCEMENTS.

##### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Western Indiana, special, 1½ per cent.  
Delaware & Bound Brook, quarterly, 2 per cent., payable May 20.

##### Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chicago & Northwestern, annual, Chicago, June 6.  
Chicago, St. Paul, Minneapolis & Omaha, annual, company's office in Hudson, Wis., June 8.

Missouri Pacific, special, at St. Louis, Wednesday, June 12. To act upon a proposed issue of bonds to replace the floating indebtedness.

St. Louis, Iron Mountain & Southern, at St. Louis, Wednesday, June 12. The meeting is for the purpose of acting upon a proposed issue of bonds to replace the floating indebtedness.

##### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The American Society of Mechanical Engineers will hold its annual meeting at Detroit, Mich., June 25, 26, 27, 28.

The American Railway Accounting Offices will hold its seventh annual meeting at Detroit, Mich., commencing Monday, May 29, at 10 o'clock a. m.

The National Association of Local Freight Agents will meet in New York City at the Broadway Central Hotel on June 11.

The Master Car Builders' Association will hold its annual convention at Thousand Islands, Alexandria Bay, N. Y., commencing June 11.

The Master Mechanics' Association will hold its convention at the Thousand Islands, commencing June 17. Applications for rooms for both the M. C. B. and M. M. conventions should be made to J. B. Wistar and Charles W. Crossman, both at Thousand Islands, Alexandria Bay, N. Y.

The International Railway Congress will meet at the Imperial Institute, London, England, beginning June 26.

The American Society of Civil Engineers will hold its annual convention at Nantasket Beach, commencing June 18.

The Western Railway Club meets in Chicago on the third Tuesday of each month, at 2 p. m.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The New England Railroad Club meets at Westeyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The Central Railway Club meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The Southern and Southwestern Railway Club meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The Northwestern Railroad Club meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The Northwestern Track and Bridge Association meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street New York, on the first and third Wednesdays in each month, at 8 p. m.

The Western Society of Engineers meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday.



day at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 86 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

#### Engineers' Club of St. Louis.

President Russell called the club to order at 8.25 p. m., May 1, 1895, 18 members and three visitors present. The minutes of the 416th meeting were read and approved.

The Secretary read a circular letter from the Western Society of Engineers on the subject of keeping the cost of the "Journal" down to \$3 per annum per member. After discussion by Messrs. Moore, Crosby, Kinealy, Winslow, Wheeler, Ockerson, Thacher and Bryan, Mr. Moore offered a resolution to the effect that it was the sense of this club that the cost of the "Journal" be limited to \$3 per year per member, and that, if necessary to keep the cost within this limit, the "Proceedings" be omitted. This motion was seconded by Mr. Crosby and adopted.

#### BOILER TESTS.

Mr. William H. Bryan then addressed the club informally on the subject of "Boiler Trials." He gave the following figures as the result of a large number of investigations made on boilers and furnaces in and near St. Louis, burning soft coals:

Average efficiency of the common boiler and furnace, 51.35 per cent.; range, 44.8 to 60.4 per cent. Water tube boilers with common furnace, 60 to 70 per cent. Best form of improved furnace: Under ordinary boilers, 58 to 69 per cent.; under water tube boilers, 70 to 75 per cent.

In capacity the maximum evaporation in pounds of water per square foot surface per hour from and at 212 deg. was as follows:

For boilers with 2 1/2-in. tubes.....	4.17
For boilers with 6-in. tubes.....	7.81
Flue boilers.....	8.85
Water tube boilers.....	7.25

The capacity on the basis of percentage of work done above the normal capacities of the boilers was as follows:

Boilers with 2 1/2-in. tubes.....	81 per cent.
Boilers with 6-in. tubes.....	113 per cent.
Boilers with large flues.....	92 per cent.
Boilers with water tubes.....	70 per cent.

In smoke performance the average of five tests, made on common boilers and furnaces, was 44.7 per cent.—the range being from 11 per cent. to 75 per cent. The average of 18 determinations on improved furnaces was 7.8—the range being from .300 to 40 per cent. Deducting the latter abnormal figure, which was clearly due to inefficient handling, the average of the remaining 17 was 5.91.

Mr. Bryan then gave the results of some trials recently made on the boilers of the St. Louis & Suburban Railway. The boilers were of the ordinary horizontal type, with 6-in. flues. The first trial was made on boilers set with the Hawley furnace; the result in efficiency being 57.75 per cent., and the cost of evaporating 1,000 lbs. of water, 12.2 cents, with Mount Olive lump coal, costing \$1.50 per ton of 2,000 lbs.

The second test was made on similar boilers with the ordinary furnace; the result being 48.83 per cent., and 14.1 cents, respectively.

The third test was made on the same boilers burning slack coal costing \$1.10, with results of 47.98 per cent., and 11.5 cents.

The fourth run was made with lump coal, with an automatic steam jet smoke abater attached; the result being 50.70 per cent., and 13.8 cents. Same results corrected for steam used for jets, were 49.16 per cent., and 14.3 cents.

The steam used for the jets was supplied by an independent 8-H. P. boiler, which was tested at the same time, giving results of 34.62 per cent., and 21.3 cents.

These figures indicate that no economy in fuel resulted from the use of the apparatus, but on the other hand it occasioned no loss. Some careful tests made by others indicate a fuel economy of from 5 to 10 per cent. under the best conditions, but Mr. Bryan was of the opinion that the ordinary non-automatic steam jets have usually increased the fuel bills.

Discussion followed by Messrs. Kinealy, Ockerson, Winslow, Laird and Wheeler.

At the meeting on May 15, the Secretary read an informal progress report of the Committee on Standard Gages for Thickness, showing that the movement for a decimal system was receiving widespread consideration and approval.

Mr. M. A. Howe, Professor of Civil Engineering Rose Polytechnic Institute, Terre Haute, Ind., addressed the Club on the subject of "Recording Bridge Deflections." He described in detail a series of experiments made by himself and classes of students in 1892 and 1894, the primary object being the collection of data for the students' theses. Very complete measuring and recording apparatus had been devised to determine the effect of moving and stationary loads on pin connected bridges, in vertical, lateral and longitudinal deflections; these three being recorded independently. He was of the opinion that the vibrations were much less than had been heretofore assumed. In several cases he had computed the deflections from approved formulæ and had found the result con-

siderably more than that actually observed. In the particular cases considered, he believed this due to the fact that the top and bottom chords were practically continuous girders, and therefore carried a large proportion of the strain.

The discussion was participated in by Messrs. Crosby, Johnson, Ockerson, Moore, Baier and Sterne. It was stated that the counterbalancing of locomotive drivers had been very much overdone, and that the best practice nowadays was to reduce it materially.

#### Western Railway Club.

The last regular meeting of Western Railway Club before its adjournment for the Summer, was held at the Auditorium, Chicago, May 21. There was an unusually large attendance, the banquet hall being well filled. Twelve new members were elected. The new constitution and by-laws were first read. It was decided to separate the offices of Secretary and Treasurer, and in the future the Secretary will be elected by the Board of Directors, while the Treasurer is to be elected as usual by a vote of the club. It was also voted to have the constitution and by-laws printed in a separate pamphlet from the regular proceedings, this pamphlet also to contain an index of the papers and discussions of the club, corrected up to the present date.

Mr. J. C. McMyrn, of R. W. Hunt & Co., then introduced the subject for topical discussion—Steam Car Heating. He presented a short paper, and was followed by Mr. A. M. Waitt, who told of the practice followed by the Lake Shore & Michigan Southern. He said he was not in favor of automatic traps, but preferred having the steam regulated by the trainmen who should be properly disciplined to do this. He also spoke of a steam valve now in use on a large number of his company's cars, which was a great improvement over the globe valve, allowing a much finer regulation of the steam, and not wearing so rapidly as the latter to permit steam passing even when the valve is apparently shut.

Mr. William Forsyth, of the C. B. & Q., also favored regulation by the trainmen, and was of the opinion that continuous steam heating was not a decided success.

Mr. S. P. Bush described the system of vacuum heating in use on the Pennsylvania lines, and said that in long trains the forward cars were usually better heated than the rear ones.

Mr. Grieves, Mr. Martin, Mr. Johnson, Mr. Barnes and Mr. Barr also spoke on the subject.

In conclusion Mr. J. F. McElroy, of the Consolidated Car Heating Co., gave a description of some tests he had made on a Baker heater to determine the circulation when the lower end of the return pipe was some distance below the level of the heater. He made use of numerous diagrams to illustrate his experiments which were very interesting. He reached a conclusion that the action did not begin until the water in the heater had reached 212 deg. Fahr. and that it was similar to the action of a geyser. Owing to the lack of time no discussion was held on his paper, but the election of officers of the club for the ensuing year was then held.

This election resulted as follows: *President*, Mr. G. L. Potter, S. M. P., Pennsylvania lines west of Pittsburgh; *Vice-Presidents*, Mr. David L. Barnes and Mr. A. M. Waitt, M. C. B., Lake Shore & Michigan Southern; *Treasurer*, Mr. J. N. Barr, S. M. P., Chicago, Milwaukee & St. Paul Railway; member of Executive Committee, Mr. P. H. Peck, M. C., Chicago & Western Indiana Railway. A meeting of the Executive Committee was immediately held and Mr. W. D. Crosman was re-elected *Secretary*.

#### The Engineers' Club of Philadelphia.

A business meeting of the Club will be held on Saturday, May 18, 1895, at 8 o'clock p. m. The paper will be on the "Wreck of the Connorsville Bridge and its Temporary Repair." (Lantern illustrations.) By Joseph Kemper.

#### COFFER-DAMS.

At the regular meeting of May 4, 1895, Mr. William H. Dechant read a paper on "Crib Work Coffers-Dams," in which he stated that such dams had long been used by the engineers in charge of canals on the Philadelphia & Reading Railroad Company. Formerly such coffer-dams were fastened together by driven bolts, commonly called rag or dock bolts, but later the following plan was used with excellent results.

An accurate set of soundings along the foundation lines of the crib is first made. The necessary sizes of crib and timbers are then determined, the latter being all sawed of uniform dimensions. The bottom parts of the crib are then fastened together upside down, so that the bottom can be blocked up and cut out to closely fit the rock or solid matter upon which the crib is to rest. The crib bottom being thus prepared and properly launched, the first course of ties and flooring is placed upon it, part being held to the crib bottom by means of driven bolts, and the balance by nails or spikes toed through the corners of the timber.

The clamp ties are properly bored to receive the screw bolts, and the bolts are fixed in them so that they cannot turn or drop. The balance of the crib timbers are then simply laid in place and temporarily held so by nails toed through their corners; the weight of the added timber gradually submerging the crib work until it has reached its proper height, when the top clamp ties are placed and the bolts all tightly screwed down, clamping the whole crib firmly together. The crib is then filled with stones to sink it and hold it in position against possible disturbing forces.

The sheet piling is then applied around the outside, and as this is a very important part of the work it should be carefully done. The plank used should be dry and carefully jointed, perfectly straight and true, with the side resting against the crib widest at the edges, so as to form a minute wedge-shaped opening between the planks, into which the small particles in muddy water may be driven, to assist in making the whole work more thoroughly water-tight. The sheet-piling plank should also be carefully fitted to the hard bottom by pointing the planks and driving them down well, then taking them up and carving out the points according to the bruises so as to closely fit the bottom. If the sheet piling has been properly done, the puddling at the bottom, which comes next, will not require much material or labor. Experience proves that after such a coffer-dam is pumped out it constantly becomes tighter by use.

When the coffer-dam is to be removed the stone filling is taken out before the water is let into the enclosure, a sufficient quantity being piled on platforms above water surface to prevent the crib from rising; the sheet piling is next taken off; the stones on the platforms are removed and the crib allowed to rise. The screw clamps being removed the whole coffer-dam is easily taken apart, all the timbers being practically uninjured.

Mr. Dechant alluded to the coffer-dams lately used for the piers of the highway bridge now building at the Falls of the Schuylkill as a good example of crib coffer. In the course of his paper he also explained the advantages of the crib-work coffer-dams over the

frequently-used clay puddle-dams. His remarks were illustrated by blue prints and blackboard sketches.

#### RAILROAD CONSTRUCTION IN THE PERUVIAN ANDES.

Mr. James R. Maxwell (visitor), the author of this paper, was introduced to the meeting by Mr. John Birkbine, who read the paper for Mr. Maxwell, as he was suffering from a cold.

After briefly describing the area and natural characteristics of Peru and its population, the principal cities were enumerated and the character of the Andes Mountains was fully described.

There are no public roads in the country on which vehicles can be used except in the vicinity of Lima, the old roads made by the Incas all over the part of South America that they controlled being only for foot passengers and llamas. They were generally well arranged for grade, but the location was often bad. The Spaniards made little improvement in roads, although they built some good stone bridges over the larger streams. There is a good wagon road from Lima to Callao, and these were all the ways of communicating with the interior until about the middle of this century, when the first railroad was built. It extended from Callao to Lima—about 7 1/2 miles—was used for passengers only, and was very profitable. The work on it was light, and the total cost not over \$150,000. Another road was built from Lima, about eight miles long, to Chorrillos, a summer resort on the Pacific Ocean.

Late in the sixties the Peruvians saw how the Chilians were opening up their country with railroads and became anxious to develop their own in the same manner. The government had a large revenue from the sale of guano, of which it had a monopoly, and so it easily floated a loan in England and organized a system of public works. A number of roads were projected, several of which were to cross the Andes, but the greater number were only local, reaching in from the coast to some productive locality.

A survey made to ascertain the expense of extending the railroad from Mollendo to Islay, only six miles along the coast, showed that it would cost \$1,500,000.

The Board of Public Works, composed of engineers—some educated in this country, but most of whom had studied in Europe—fixed the standards for maximum rates of grade, minimum radii of curves, minimum length of tangents between the curves in opposite directions and the rate of compensation on curves, with some of the details of construction. The maximum grade was fixed at 4 per cent. On curves of 120 metres radius the grade was fixed at 3 per cent., while with 600 metres radius no compensation was required, and between these limits the rate was made proportional. The minimum length of tangents on curves turning in opposite directions was made 30 metres. The standard road-bed was 14 feet wide; cuts, 16 feet at sub-grade; through bridges, not less than 14 feet in the clear; tunnels, 15.75 feet at the springing line of the arch and 18 feet high inside; minimum thickness of masonry lining 16 inches. The gage of most of the roads was 4 feet 8 1/2 inches, but there was one road of a metre gage and a small one of 3 feet 6 inches. The contracts for most of these roads were let in 1869.

Mr. Maxwell then described in detail the construction of the roads from Chimbote up the valley of the Rio Santa, 165 miles, to Recuay, and the Southern System, the largest in Peru, consisting of the road from Mollendo, 107 miles, to Arequipa, from there, 218 miles, to Puno, and another, from Juliaca, 210 miles, to Cuzco, of which only 112 miles are finished. The road from Juliaca runs nearly due north and crosses the summit of the eastern range at an elevation of 14,200 feet. When finished, the lowest elevation on the Cuzco branch will be 10,050 feet above tide.

The most celebrated of the roads is the Ferro Carril Central del Peru. Starting at the docks in Callao, it keeps rising until, at 106 miles from the coast, it reaches a height of 15,666 ft. (about that of Mt. Blanc). It then descends, and in 30 miles falls 3,489 ft. When completed 264 miles farther, it will reach the navigable waters of the Amazon, and this extension will probably not cost more than half as much as the finished portion. There are eight switchbacks on this road, four of them being double. There are 57 tunnels in a distance of 24 miles, mostly through rock spurs. Work was begun on this road in 1870, the track being laid to Chicla in 1875. It was resumed in 1890, and track was laid into Oroya on June 10, 1893. All of this work was done at an altitude above 12,000 ft., the most difficult and important of it, containing the two largest bridges, and eight of the tunnels being above 15,000 ft.

#### PERSONAL.

—Mr. Duncan C. Brown, Superintendent of the Building Department of the Michigan Central, died at Niles, Mich., on May 24.

—Mr. F. W. McCutcheon has been appointed Receiver of the Winona & South-Western in Minnesota, to succeed Mr. T. R. Selmes, resigned.

—Mr. A. J. DeRussy, General Pacific Coast Freight Agent of the Texas & Pacific at San Francisco, has been appointed Division Freight Agent of that road, with headquarters at New Orleans, La.

—Mr. E. H. Edwards, accountant of the Erie & Huron, in Canada, has been appointed General Freight and Passenger Agent of that road, to succeed Mr. W. J. Valteau, with headquarters at Chatham, Ont.

—Mr. A. M. Underhill, assistant engineer of the Chicago division of the Pennsylvania lines, has been appointed engineer of maintenance of way of the Peoria division of the Vandalia line, with headquarters at Terre Haute, Ind.

—Mr. T. C. Clarke has resigned his position as Engineer of the New York State Commission appointed to locate the New York & New Jersey Bridge; and he has also resigned his position as Chief Engineer of the New York & New Jersey Bridge Co.

—Mr. John T. McBride, who was recently General Manager of the Everett & Monte Cristo Railroad, which operates about 30 miles of railroad in the Puget Sound district of Washington, has recently been elected Vice-President of the Duluth, Missabe & Northern Railroad in Minnesota, which is owned by much the same interest as that controlling the Everett & Monte Cristo Railroad.

—Mr. E. E. Calvin, Superintendent of the Idaho division of the Union Pacific, it is announced, has resigned that position to go to the International Great Northern as General Superintendent, his headquarters being at Palestine, Tex. Mr. Calvin has been Superintendent at Pocatello, Idaho, for something over four years, going to the Union Pacific from the Missouri Pacific, where he was Division Superintendent. Mr. H. E. Van Hoover, present Assistant Superintendent under Mr. Calvin, will succeed him as Division Superintendent of the Union Pacific in Idaho.



—Mr. John C. Trautwine, Jr., of Philadelphia, has been appointed Chief of the Water Bureau of that city. Mr. Trautwine is a son of the author of the "Pocket Book," and he has edited the revised editions of that work published since the death of his father. He is a member of the Engineers' Club of Philadelphia, and was its President last year. He is also a member of the Franklin Institute, and an associate of the American Society of Civil Engineers and of the Institution of Civil Engineers of London. During the past year he has been Secretary of the Association of Engineering Societies and the Manager of the *Journal* of the association.

—Mr. Thomas L. Peeler, formerly General Superintendent of the Toledo & Ohio Central and the Kanawha & Michigan, which are operated under one management, died at Anna, Ill., on May 20. He had been out of railroad service for the last two years. He had a long railroad career, beginning in 1867 on the Illinois Central, with which company he remained for several years. He was afterwards on the Evansville & Terre Haute, advancing from Train Dispatcher to Superintendent of Transportation in 1881, and from that road he went to the Ohio Central, becoming successively Assistant Superintendent, Superintendent and General Superintendent.

—Mr. James G. Dagon, formerly with the Baltimore & Ohio Railroad as Engineer of Bridges and Buildings, died at Philadelphia last week. He was taken ill in a train returning from Wilmington to Philadelphia and died in a hospital at the latter city within half an hour after being removed from the train. He was in the service of the engineering department of the Baltimore & Ohio Railroad for a number of years as inspector of bridges and bridge material. He was appointed engineer of bridges and buildings soon after Colonel Douglas became chief engineer of the company. Two years ago he left the railroad service, and recently has been engineer in the construction of one of the electric street railroads at Philadelphia. He was elected a member of the American Society of Civil Engineers in 1886.

#### ELECTIONS AND APPOINTMENTS.

**Colorado Midland.**—Le Grand Cannon has been appointed Auditor for Receiver Ristine, with headquarters at Denver, Col.

**Evansville & Richmond.**—H. C. Barlow, President of the Evansville & Terre Haute Railroad, has been appointed Receiver of the Evansville & Richmond road, vice Col. James Montgomery, resigned. The Evansville & Richmond thus again passes into control of the Evansville & Terre Haute.

**Georgia Southern & Florida.**—The purchasers of this property at the recent foreclosure sale have selected William Checkley Shaw, of Baltimore, as President; Mr. W. B. Sparks, who has been Receiver of the road since 1891, General Manager; and H. M. Powers, of Macon, Treasurer. The following board of directors were chosen: H. M. Smart, Savannah, Chairman; Thomas B. Gresham, Charles D. Fisher, Skipwith Wilmer, William Checkley Shaw, Baltimore; R. U. Herrman and Henry Rice, New York City; and a local board of directors at Macon, Ga., consisting of Charles L. Bartlett, B. C. Smith and W. H. Felton and W. H. Felton, Jr., and a local board at Savannah, consisting of William Rogers, Edward McIntyre, C. D. Baldwin and A. B. Hull.

**Ohio River.**—George Coleman has been appointed general foreman of the shops of the Ohio River Railroad at Parkersburg, W. Va.

**Omaha & St. Louis.**—At a meeting of the stockholders of the company held last week Henry W. Eaton, Cornelius B. Gold, George Warren Smith, James H. Smith, Charles G. Thompson, Walter Bound and W. Emlen Roosevelt, were elected directors.

**Plant System.**—H. A. Ford has been appointed Superintendent of the South Florida division of the Plant system, with headquarters at Sanford, Fla.

**Roston, Concord & Montreal.**—The annual meeting of the railroad was held this week, and the following directors were chosen: Samuel S. Kimball, L. S. Pattee, Fred P. Weeks, Charles A. Busiel, Charles H. Bowles, N. S. Clark, H. N. Turner, C. E. Morrison and N. P. Hunt. They organized as follows: President, Samuel S. Kimball; Clerk, Nathan P. Hunt. The Treasurer holds over from last year.

**San Francisco & San Joaquin Valley.**—The trustees of the railroad have organized by selecting the following officers: President, Thomas Brown, Bank of California, San Francisco; Vice-President, L. White, San Francisco Savings Union; Secretary, James D. Phelan; Assistant Secretary, Daniel Meyer.

#### RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

**Alabama Great Southern.**—The citizens of Gainesville, Ala., are organizing a local company to build a railroad to connect that town, which is situated on the Tombigbee River in the north of Alabama, near the Mississippi State line, with the Alabama Great Southern. The connection will be made at a point on the Alabama Great Southern between Meridian, Miss., and Tuscaloosa, and the new branch line will be about nine miles in length. When completed, it will be operated by the Alabama Great Southern.

**Au Sable & Northwestern.**—The project of extension beyond the present northern terminus to Vienna, Mich., near the Twin Lakes is likely to be undertaken this summer. The new line will be about seven miles long, beginning at Lewiston, the terminus of the line now in operation. The work will be in charge of Mr. Geo. A. Loud, General Manager.

**Chicago & West Michigan.**—McDonnell Bros. & Co., of Grand Rapids, Mich., have been awarded the contract for the grading work on the seven mile branch line from Turtle Lake to the town of Hoonr. The new branch is for the convenience of the United States Veneer Works, which is building a new factory at Hoonr, which is in the vicinity of a large tract of hard wood timber.

**Colorado, Wyoming & Great Northern.**—The Security Loan & Trust Company, of Philadelphia, has accepted the position as trustee in the construction company. Bonds will be issued for \$6,000,000 instead \$3,000,000 as was first planned. It is stated that an offer of 80 per cent. for the bonds on the first 100 miles of the proposed line out of Grand Junction, Cal., has been made. A Wyoming company is to be incorporated to join with the Colorado company in building into western Wyoming to open up iron deposits.

**Columbus, Huntington & Guyandotte.**—The coun-

ties of Cabell, Lincoln, Logan, Wayne and Wyoming, in West Virginia, have all ordered elections to be held during June, to decide upon the question of issuing bonds for \$250,000 in aid of this project, incorporated to build a railroad from Huntington, on the Ohio River, up the valley of the Guyandotte River, in West Virginia. This proposed line was recently described in the *Railroad Gazette*, under the title of the Guyandotte Valley Railroad.

**Davenport, Clinton & Eastern.**—The surveys have been made by this company for a railroad along the west bank of the Mississippi river from the town of Clinton, north to Davenport, Iowa, and the President, L. N. Downs, of Davenport, Iowa, states that the contracts for the construction of 35 miles of line between these points will be awarded about June 16. He will also, he states, give out the contracts for equipment in that month, and the erection of the shops at Davenport will be begun in June also.

**Fernandina Western.**—The organization of this company was recently completed at a meeting of the projectors at Fernandina, Fla., and the surveys have now been begun west of that town. It is intended to continue them as far as Jasper, Fla., nearly 100 miles west, and at a junction of the South Florida and Savannah, Florida & Western divisions of the Plant system. Samuel A. Swann, of Fernandina, was elected President of the meeting referred to, Wm. R. Kelly, Vice-President, and John G. McGiffen, General Manager.

**Halo Hardwood Co.**—This company has been formed to operate at Sutton, Braxton County, W. Va. It has contracted for building ten miles of railroad, beginning at Sutton, and following Laurel Creek, two miles, thence up Big Run five miles, thence up Elk River three miles. The road will be for the primary purpose of getting logs to the company's mills at Sutton, but it is contemplated to open it to general traffic later.

**Hendersonville & Brevard.**—The first locomotive to be used on this new road, which extends from Hendersonville to Brevard, N. C., was received last week, and service over the line will commence during the month of June. The road will be completed by July 10, it is announced.

**Hinton, New River & Western.**—A charter has been issued in West Virginia to this company to build a railroad from Hinton, Summers County, up New River, to the Virginia state line, also a branch to run up Blue Stone River, to Piney River, to Coal River, and on Coal River to St. Albans, and along Kanawha River from St. Albans to Charleston. The incorporators are James L. McCreery, J. A. Parker, R. R. Flanagan, M. J. Cook and James H. Miller, all of Hinton, W. Va. The new company is practically a reorganization of the Hinton & New River Railroad, chartered about a year ago, and which proposed to build a line over part of the same route, but which found it necessary to reorganize to secure a new route, which would be more easy to build and which would assure local support. The stockholders met at Hinton last week and elected the following directors: J. C. James, J. H. Miller, M. J. Cook, R. R. Flanagan and J. T. McCreery. Mr. McCreery was elected President and General Manager; J. C. James, Vice-President and Treasurer, and J. A. Parker, Secretary. President McCreery states that the engineers have made a complete survey of the new route, and have found it entirely practicable, and the location will now be made. The road is to be built over a territory rich in both coal and timber, being underlaid throughout with the New River coking coal seam, while the timber is heavy almost all the way from Hinton to Charleston.

**Kansas City & Northern Connecting.**—A charter was issued to this company last week, A. E. Stillwell, Vice-President of the Kansas City, Pittsburgh & Gulf Railroad, being the largest shareholder; the other stockholders including Robert Gillham, F. A. Faxon and Frank Cooper, all engaged in business in Kansas City. The object of the company, as stated, is to build a connecting line at Kansas City to give three Eastern railroads an entrance into Kansas City, but it is not stated with any definiteness what railroads it is expected will avail themselves of the facilities to be provided.

**Lake Temiscamingue Colonization.**—This branch of the Canadian Pacific, which leaves that line at Mattawa, Ont., is now completed for a distance of 50 miles, and the bridge over the Ottawa River will probably be completed in the fall. The structure will be 2,200 ft. in length.

**Louisville & Nashville.**—The branch of the South and North Alabama division of this company from Coosada, Ala., has been awarded to the firm of J. W. Worthington & Co., of Montgomery, Ala., and considerable progress has already been made by that firm on the grading. Coosada is a station a short distance north of Montgomery, and the branch will extend northwesterly about five miles to Prattville, Ala.

**Northern New York.**—A certificate of incorporation of the company was filed at Albany, N. Y. It is a reorganization of the Northern Adirondack road. The latter had been in the hands of the Franklin Trust Company, of New York City, for several years, and the trust company sold it to the new company under foreclosure proceedings last week. The road extends from Moira to Tupper Lake, in Franklin County, with a branch from Black Rapids Junction to Black Rapids, and is about 56 miles long. The capital stock of the new company is \$1,000,000. The directors are: Charles B. Hibbard, of Minneapolis; Charles E. Arnold, Alfred J. Voyer, of Albany; Frank L. Sniffin, Crowell Hadden, James L. Cowing and George H. Southard, of Brooklyn; Charles C. Couthard, of Plainfield, N. J., and George I. Humphreys, of Saratoga.

**Rumford Falls & Rangeley.**—Track laying on the railroad north of Rumford Falls will be commenced at once. The rails have been delivered and the 18 miles already graded will be completed at the rate of half a mile a day.

**Springfield, Harrison & Little Rock.**—T. L. Dougherty, Chief Engineer, reports that the locating survey south of Springfield, Mo., is now being made. The preliminary survey is already completed from Springfield as far as Harrison, a town in the north part of Arkansas, southeast of Springfield. The project was first taken up about two years ago by Mr. W. E. Winner, of Kansas City, at one time president of the company building the so-called Winner bridge over the Missouri River at Kansas City. Under his administration surveys of the railroad were made and some little grading was done, but the project has been inactive for quite some time.

**Union Pacific, Denver & Gulf.**—No further work on the connecting line between Pueblo and Trinidad, Col., will be done, the company having completed an amicable agreement with the Denver and Rio Grande for the use of its track between the places mentioned.

#### GENERAL RAILROAD NEWS.

**Amsterdam, Johnstown & Gloversville.**—The General Term of the New York Supreme Court has sustained the ruling of the State Railroad Commissioners in refusing to grant permission for the building of the proposed Amsterdam, Johnstown & Gloversville Railroad, being the first time an order in such a matter has been made by the courts. The law compels new roads to get certificates authorizing them to build their lines from the State Commissioners. In this case the Board for the first time refused to grant such authority on the ground that the proposed road would parallel the Fonda, Johnstown & Gloversville line, and that neither public necessity nor convenience required the building of another road.

**Atchison, Topeka & Santa Fe.**—Secretary Kobbe, of the joint executive reorganization committee, says that the deposits of 4 per cent. bonds with the committee up to date amount to about \$45,000,000, out of a total of \$65,000,000. About the same relative proportion of the other bonds of the company has been deposited. It is expected that before June 10 the deposits will be largely increased, and that there is no doubt that the plan will be declared effective on or before that date.

**Central Pacific.**—The company reports its earnings for the year ending December 31.

	1894.	1893.	Dec
Gross earn.....	\$13,118,244	\$14,319,907	\$1,201,663
Oper. Exp.....	8,168,857	8,521,839	353,032
Net earn.....	\$4,949,387	\$5,798,068	\$848,631
Charges.....	4,804,791	5,013,299	208,568

Surplus.....\$144,596 \$784,719 \$840,123

**Cleveland, Cincinnati, Chicago & St. Louis.**—A contract has been made between the Baltimore & Ohio Southwestern and the Big Four for the joint use of the former's tracks from North Vernon, Ind., into Louisville. The joint arrangement goes into effect July 1. The Big Four will carry no local business between North Vernon and Jeffersonville.

**Gulf & Interstate.**—Horace M. Dake, of Brookfield, Mo., has been appointed Receiver of the Populist, the Gulf & Interstate Railroad, known as the North & South Railroad, by a Kansas District Court. Judgments amounting to \$3,240 have been obtained against the company in Kansas, \$3,000 of it being in favor of Dake as salary as Vice-President of the company. F. J. Close, of Topeka, who has been at the head of the Kansas company, will endeavor to secure the discharge of the Receiver. The Kansas company has never done any work beyond securing subscription to its stock. The work being done in Texas is by a distinct corporation, though the work was begun as the Texas division of the line.

**Oregon Railway and Navigation Co.**—The committee representing the collateral trust mortgage bonds, of which S. Endicott Peabody is Chairman, announces that a plan has been prepared for the reorganization of the Oregon Railway & Navigation Company which meets with the approval of the several committees representing the various interests in that property. The holders of the bonds represented by the committee, to the amount acquired by the mortgage, have requested the American Loan & Trust Co., of Boston, as trustee, to offer for sale the shares of the Oregon Railway & Navigation Co., held as collateral for the bonds, and the sale will take place in New York City June 25.

**Pennsylvania.**—The April statement of earnings shows gross earnings \$441,456 ahead of 1894, but expenses were increased \$327,877, so that the gain in net earnings was but \$113,579. Below is the comparative statement for April and four months:

	1895.	1894	Increase.
Gross earn.....	\$5,205,472	\$4,764,016	\$441,456
Oper. exp.....	3,694,064	3,366,187	327,877
Net earn.....	\$1,511,408	\$1,397,829	\$113,579
Since Jan. 1:			
Gross earn.....	\$19,436,910	\$17,838,528	\$1,598,382
Oper. exp.....	14,241,582	13,043,722	1,237,860
Net earn.....	\$5,195,328	\$4,794,806	\$400,522

Lines west of Pittsburgh and Erie for April show a gross increase of \$228,084, and a net decrease of \$27,730. From Jan. 1 to April 30 the gross earnings increased \$811,005, and net earnings increased \$337,182.

**Philadelphia & Reading.**—The receivers are reported to have effected a rearrangement of the Coal & Iron Company's contract with the Finance Company of Pennsylvania, which, it is stated, will materially reduce the annual rate of compensation heretofore paid the Finance Company by the Reading companies, but extends the life of the contracts. The old contract, under which the company was to receive for five years, which has yet upward of two years to run, an annual payment of \$150,000, and which was extended for about one year additional with a payment of \$75,000 per annum, is to be cancelled, and a new contract has been made by the receivers which will extend for a period of 10 years from April 1, 1894, under which the Finance Company will receive an annual compensation of \$50,000 for acting as fiscal agent for the Reading Coal & Iron Company.

**Terminal Railroad Association of St. Louis.**—J. Pierpont Morgan & Co., of New York City, offered for subscription this week \$4,500,000 five per cent. 50 year first consolidated bonds of the railroad, part of an authorized issue of \$12,000,000, of which \$7,000,000 are reserved to take up the present first mortgage bonds, and \$5,000,000 to construct a belt line in East St. Louis. Out of the \$4,500,000 which is now offered \$3,500,000 take the place of second mortgage bonds of a like amount, part of which have never been issued.

**Union Pacific.**—The report of earnings for the year ending Dec. 31 is given in the following table:

	1894.	1893.	1892.
Av. miles oper.....	5,327	5,167	5,149
Gross earn.....	\$23,234,053	\$37,444,417	\$45,025,170
Oper. ex.....	17,553,632	27,236,019	30,144,075
Net earn.....	\$5,680,421	\$10,159,398	\$14,880,501
Other income.....	708,747	1,000,682	1,616,350
Total income.....	\$6,389,168	\$11,160,080	\$16,496,851
All charges.....	10,397,395	13,755,921	14,427,094
Deficit.....	\$4,008,226	\$2,595,841	\$2,069,757

The Oregon Short Line & Utah Northern Railroad Company reports for the year ending Dec. 31:

	1894.	1893.	1892.
Gross earn.....	\$5,046,682	\$5,861,634	\$7,201,199
Net earn.....	1,151,447	2,078,539	2,670,122
Other income.....	98,500	698,220	1,149,443
Total income.....	\$1,249,947	\$2,776,759	\$3,819,565
Fixed charges.....	2,803,673	5,007,574	4,228,672
Deficit.....	\$1,553,731	\$2,230,815	\$1,909,007

The charges in 1892-93 included the dividend guaranteed upon Oregon Railway & Navigation Co.'s stock.